Apr. 1949

# Chemical Industries

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Cover: Hot-pressing melamine-bonded plywood

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Properties of commercial-production grades are shown below. Intermediate grades, and grades with surface-area up to 300 square meters per gram can be furnished.

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**COMMERCIAL GRADES — WESTVACO MgO**

| Grade | 2665 | 2641 | 2642 | 2652–S |
|---|---|---|---|---|
| Surface Area, $m^2/g$ | 32 | 70 | 140 | 140 |
| Commercial Iodine No | 17 | 60 | 87 | 90 |
| Bulk Density, lb/cu ft | 27 | 32 | 40 | 50 |
| Approx. particle size (microns) | 2 | 2 | 5 | 8–28 mesh |
| Ignition loss, % | 2.5 | 18.8 | 10.8 | 10.8 |

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# Chemical Industries

Vol. 64, No. 2

FEBRUARY 1949

THE MAGAZINE OF THE CHEMICAL PROCESS INDUSTRIES



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Oil Slick Sinker
Aerosol Extinguisher
Sterol Derivatives, Inc.
Quaternary Testing
Berk's Zirconium Plant
Textile Advances
New Products Nurture
Sulfur from Petroleum
Stickwater Utilization
NOCl-Based Detergent
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# THE READER WRITES

### *For Training Trainees*

*To the Editor of Chemcal Industries:*

I want to thank you for publishing the article "What Makes a Good College Trainee for Chemical Companies?" in the Jan. 1949 issue.

This information is of great value to those of us who are trying to "train the trainee" and should be generally useful in placing trainees in any industry.

R. C. ROBERTS
Chairman, Dept. of Chemistry
Colgate University
Hamilton, N. Y.

### *Torula Feed Yeast Selling at 11c a lb.*

*To the Editor of Chemical Industries:*

We were glad to see the article on torula yeast in your January issue.

You will be interested to know that the Rhinelander plant of the Lake States Yeast Corp. has been in operation for some eight weeks now. While expected operational "bugs" have developed in great numbers, we have as yet met with no situations, either process-wise or mechanical, which have caused us to change in any way our original belief in the ultimate success of the venture.

We are unable at this time to quote any production costs that would have any meaning. We are, however, producing market quantities of torula yeast and have been selling it at an arbitrary level of approximately 11 cents a pound.

J. M. HOLDERBY, General Manager
Lake States Yeast Corp.
Appleton, Wis.

### *Association Members Make 90% of Total Soap*

*To the Editor of Chemical Industries:*

One of our members has called our attention to a statement in your September, 1948, issue on page 365.

This indicates that the sales census of this Association represents about 90% of the total production of synthetic detergents. This statement is in error.

We are not attempting to make any estimate of the percentage of sales of members to the total synthetic detergent production but feel sure that it is considerably less than 90%. The 90% applies to our member sales of soap compared to total soap production.

Since we will shortly be releasing new synthetic detergent sales figures for the year 1948, we thought we should call your attention to this.

ROY W. PEET
Assoc. of American Soap & Glycerine Producers, Inc.
New York, N. Y.

### *Bersworth Pioneered Amino Sequestering Agents*

*To the Editor of Chemical Industries:*

I request that you print a correction on your article "Fettered Ions" which appeared on page 766 of the November, 1948, issue of CHEMICAL INDUSTRIES in view of the following facts:

1. The polycarboxylic amino acid sequestering agents were not first developed in Germany, as stated in the article. Ethylene diamine tetra acetic acid, the most important of these substances, was first made in 1929 by F. C. Bersworth, working with Professors William Warren and Benjamin Merigold at Clark University.

2. Your article failed to give due credit to F. C. Bersworth or to the Bersworth Chemical Co. in this important development in organic chemistry. The Bersworth Chemical Co., of Framingham, Mass., has been manufacturing and marketing these sequestering agents (in the form of a solution of their sodium salts) for a number of years and, in fact, the Bersworth Laboratories, the predecessors of the Bersworth Chemical Co., distributed samples of this material for use as a sequestering agent a number of years prior to the issuance of the German-owned patents now held by General Aniline.

3. F. C. Bersworth holds a number of patents on processes for the preparation of these and various other amino acids, salts, derivatives and various compositions containing the same, and has been very active for a number of years in acquainting industry with the chemical properties of this class of compound and in assisting industry in adapting them to special fields of use.

F. C. BERSWORTH
Bersworth Chemical Co.
Framingham, Mass.

*Chemical Industries has no desire to overlook the giving of credit where it is due. Dr. Bersworth did prepare ethylene diamine tetra acetic acid and its sodium salt in the laboratory as early as 1929 by the process described in the Munz patent, originally filed in Germany in 1935. He deserves full credit for this and his extensive subsequent work on the polycarboxylic amino acids, several of which were used in the rubber program during the war.*

*As far as their development and use on a commercial scale is concerned, however, Germany was several years ahead of the United States.*—ED.


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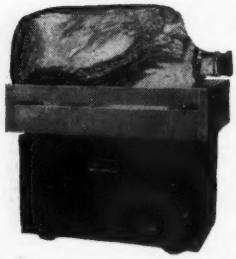
**With Utility Box Carrier Operates from 100 to 300 Oscillations per Minute**



**The utility box carrier measuring 18" x 12" x 4" deep is large enough to handle a 5 gallon bottle as illustrated, or the rubber-covered bar clamps can be fastened anywhere in the slots they travel to hold various size containers in the utility box. The sturdy 1/6 H.P. motor has substantially constant torque from no load to full load at any given setting of the speed control. Attractive in appearance, the carrier is satin anodized aluminum; the base is finished with instrument black wrinkle. Cat. no. 75-683A described and illustrated above sells for $175.00. One and two speed models and carriers for 250 and 500 ml. flasks are also available.**

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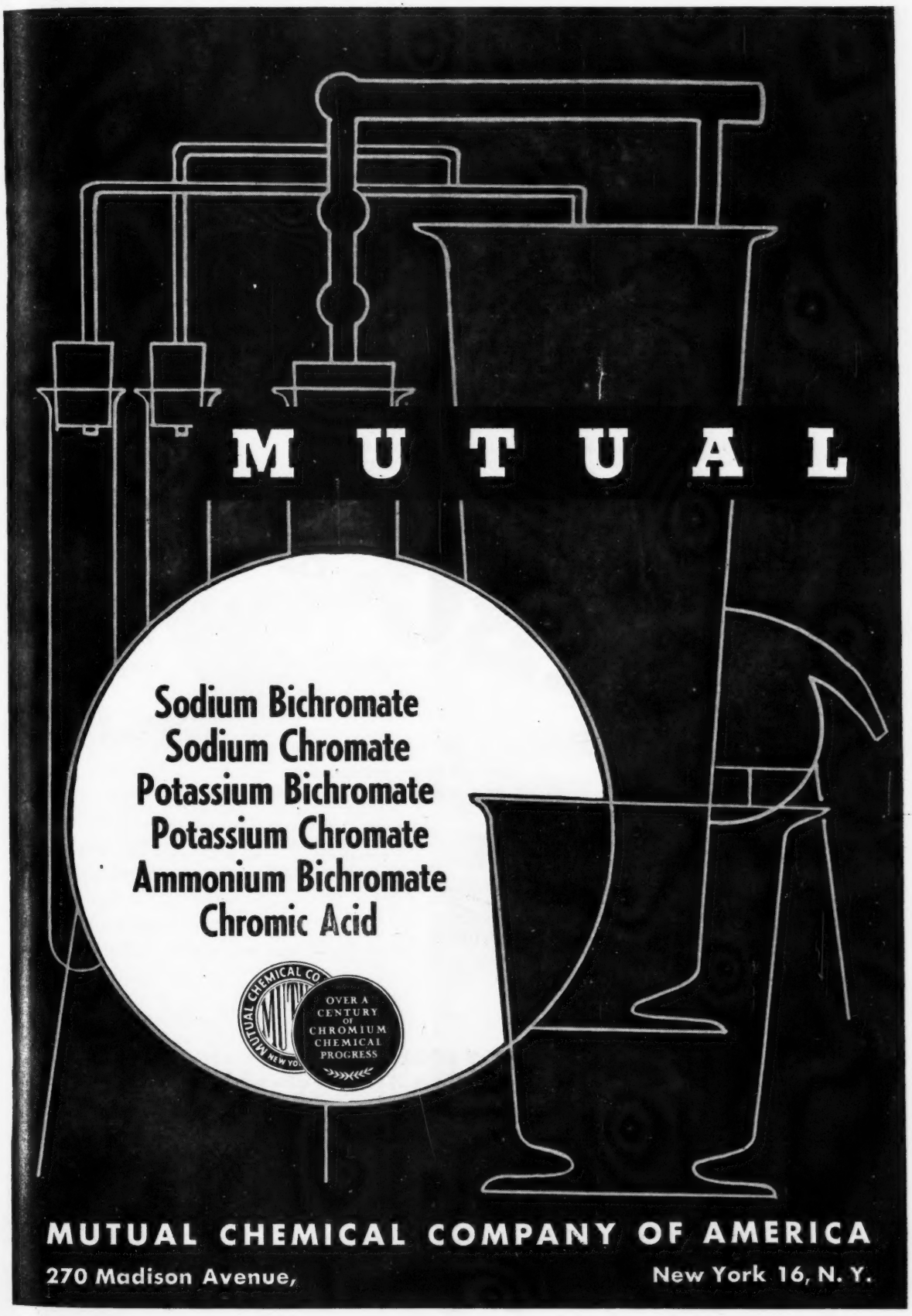
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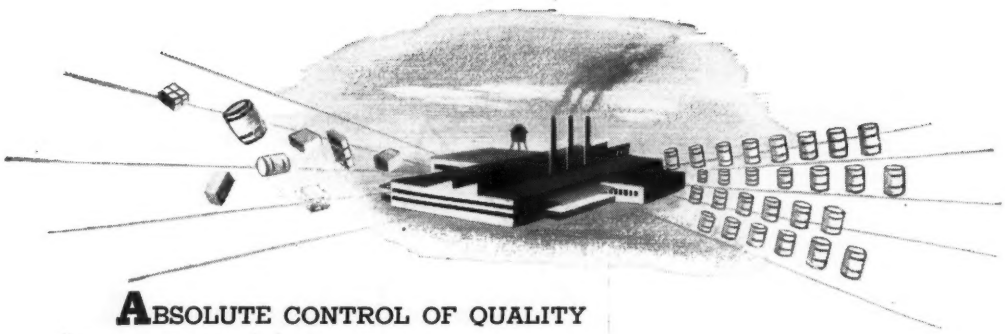
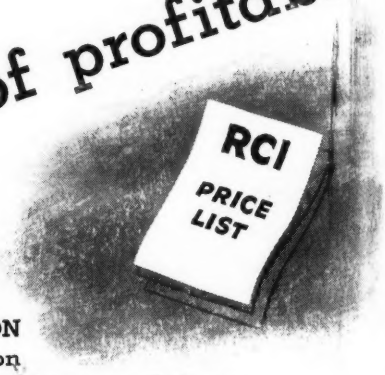
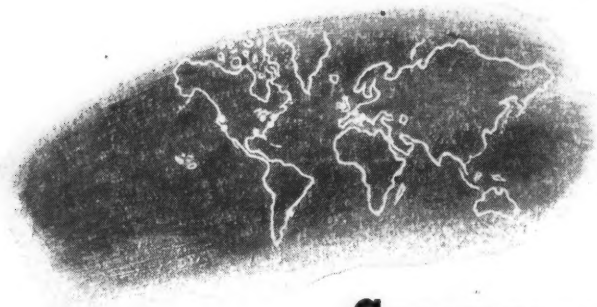


**ABSOLUTE CONTROL OF QUALITY**
**from raw materials to finished product.** Long a major producer of glycerine and phenol, RCI recently opened its own maleic anhydride plant, while another phthalic anhydride plant—nearly tripling RCI production of this item—is now in operation. Quality is standardized at the start to ease and simplify your production of finished products.

# the ABC's of profitable




**BETTER PRICE PROTECTION**
**through huge production and raw material control.** RCI produces more alkyd resins than all competitors combined and is a major producer of other types of synthetic resins, as well as chemical pigment colors. The result is a consistently low price policy which you can "bank on" in setting your own prices.



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Any way you figure your best buy is **RCI**

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**Surface Coating Resins**
and
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The present and future of RCI depends entirely on your prosperity—for RCI manufactures no end products or "consumer goods." Every resource is pointed toward supplying you with basic raw materials at a quality and price that will build your reputation, simplify your production, and increase your margin of profit. Get the facts . . . and let your own good judgment prove that it pays to do business with a specialist as big and experienced as RCI.

Any way you figure—your best buy is RCI.

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Isopropyl Ether—$C_3H_7OC_3H_7$
Methyl Ethyl Ketone—$CH_3COC_2H_5$

**ENJAY HYDROCARBONS**

Butadiene—$CH_2{:}CHCH{:}CH_2$
Isobutylene—$CH_2{:}C(CH_3)_2$
Diisobutylene—$CH_2{:}C(CH_3)CH_2C(CH_3)_3$†
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† *Other isomers also present.*

**CTLA POLYMER** — An economical heat-reactive, aromatic-type olefinic hydrocarbon. Highly unsaturated. Dries by polymerization and oxidation. Miscible in all proportions with drying oils. Compatible with most resins.

ENJAY

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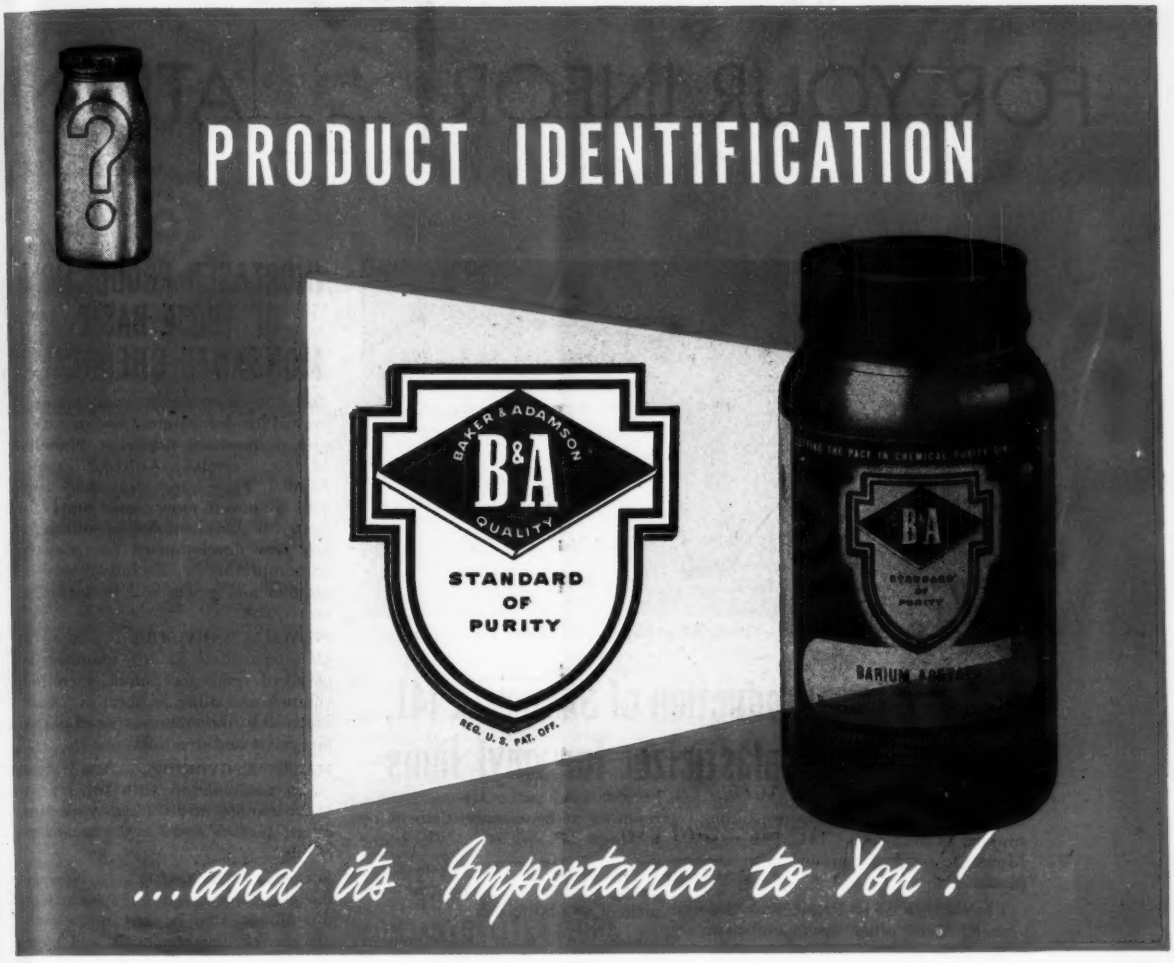


Behind the identifying trade-mark of every product, stands the integrity and reputation of the maker. As a chemist, you know how important this is in the chemicals you use . . . and how it may affect the results you get.

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*Complete stocks are carried here.

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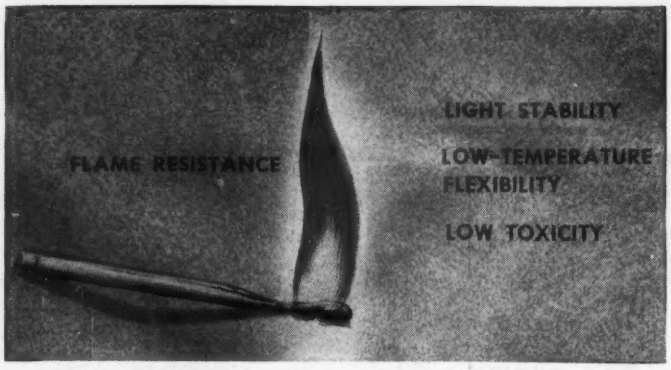


Vinyl films plasticized with Santicizer 141 help prevent fires caused by accident or carelessness.

## Large-scale production of SANTICIZER 141, fire-resistant plasticizer for vinyl films

New production facilities assure ample supplies of Santicizer* 141. This new Monsanto product combines into one plasticizer:

FLAME RESISTANCE — Unmatched by other equally efficient plasticizers. Eliminates the need for expensive pigment fire-retardants.

LOW-TEMPERATURE FLEXIBILITY — Vinyl articles containing this plasticizer remain flexible at low temperatures. Equal or superior to the most commonly used vinyl plasticizers.

LIGHT STABILITY — Plasticized vinyl compositions age 25-50% longer. Flexibility and color are retained without embrittlement or tackiness.

LOW TOXICITY — Tests show Santicizer 141 to be one of the least toxic of all plasticizers.

Shipment can be made immediately in tank car, drum car or LCL lots.

**Send for this free booklet**

If you are interested in processing fire-resistant polyvinyl chloride films, ask for a copy of "Santicizer 141 . . . the SAFE Plasticizer." Liberally illustrated, it contains full descriptive and technical data.

## INCREASED PRODUCTION OF THESE BASIC MONSANTO CHEMICALS

You can now direct your research toward the development and manufacture of products requiring Phthalic, Maleic, Succinic Anhydrides and Benthal. These basic Monsanto chemicals are now in more ample supply for recognized applications, as well as for any new developments you may be contemplating . . . Technical advice, samples and prices will be furnished on request.

**PHTHALIC ANHYDRIDE** . . . Used as an intermediate in the manufacture of alkyd resins for paints, varnishes, enamels and other finishes; as a basic material in the manufacture of phthalate esters and dyestuffs.

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**SUCCINIC ANHYDRIDE** . . . Now for the first time in volume production, this dibasic acid is used in the manufacture of fine chemicals and pharmaceuticals, esters, resins.

**BENTHAL*** . . . A monobasic acid designed for the resin industry. The replacement of a portion of the dibasic acid with Benthal in alkyd resins will retard the bodying and permit longer processing time in order to reduce the acid value of the product. Benthal becomes part of the resin molecule and acts as an internal plasticizer—improving flexibility and adhesion.

## *New Germicide . . .* SANTOPHEN 1

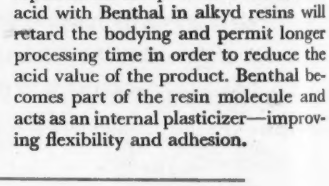
**POWERFUL . . . ECONOMICAL . . . AVAILABLE**

Santophen* 1* (Monsanto's o-Benzyl-p-Chlorophenol, Technical) has the following important advantages:

Highly toxic to bacteria and fungi • non-irritating when properly formulated • non-staining • non-corrosive to most metals • nearly colorless • faint, agreeable odor • comes as easy-to-handle flaked solid.

In proper formulations, Santophen 1 is useful for a wide variety of germicidal applications, some of which are shown at the right . . . It is now available from Monsanto in commercial quantities. For additional information, technical data and suggested formulations, send for a copy of Monsanto Technical Bulletin O-51, "Santophen 1 for Use in Disinfectants."

**Some typical uses for Santophen 1**

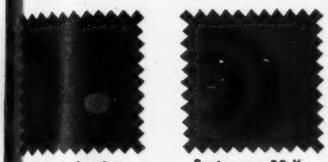


Sanitizing rest rooms and locker rooms

Disinfecting poultry and livestock shelters

Disinfecting hospital floors, walls and equipment

Controlling athlete's foot around swimming pools



Untreated water | Santomerse 30-X added

## WET PROCESSING

**Santomerse 30-X for textiles**

A new, low-cost, high-efficiency **liquid** synthetic detergent and wetting agent of the alkyl aryl sulfonate type is now available from Monsanto. Known as Santomerse* 30-X, it is designed to provide quick and effective results at minimum cost.

Santomerse 30-X is particularly useful in processing textiles—where wetting, penetration and dispersion are important . . . Its attractive color, viscosity and high detergent value also make it well suited for liquid cleaners.

Santomerse 30-X is a crystal-clear, pale-yellow, viscous liquid containing 30% solids. The solids content is made up of 85% active alkyl aryl sulfonate and 15% sodium sulfate. It is stable in the hardest water and provides remarkable resistance to decomposition by either strong acids or alkalies, even under extreme conditions . . . For application and technical data, write for a copy of Monsanto Technical Bulletin No. P-135.

**Other Detergents and Wetting Agents**

Santomerse 30-X, described above, is just one of Monsanto's complete series of synthetic detergents and wetting agents. Furnished in flake, powder, paste and liquid forms, the Santomerses are also highly effective as penetrants, emulsifiers, dispersing, spreading and foaming agents.

The Santomerses are adapted to a wide variety of industrial cleaning and wetting operations—textiles, dairies, laundries, metal processing, bottle washing, leather, paper—to mention just a few. For complete information, ask for copies of Monsanto Application Data Bulletin No. P-118, "Santomerse No. 1," and Technical Bulletin No. P-123, describing other products of this group.

## REPRINTS OF NEW PRODUCTS ANNOUNCEMENT AVAILABLE

Twenty-five new Monsanto chemicals—for a wide variety of industrial uses—are described in a two-page advertisement in January issues of chemical trade publications.

If, by any chance, you missed this advertisement, send today for a reprint . . . Among these chemicals it is likely that you will find one or more which will enable you to reduce production costs, improve product performance and sales.

## HOW TO GET MONSANTO LITERATURE

Instructive booklets, folders and technical bulletins are available for many of the hundreds of Monsanto chemicals for industry. In addition, new and revised literature is continually in preparation . . . To obtain copies free of charge, simply tell us the products in which you are interested—available material will be sent you promptly; new literature will be forwarded as soon as completed.

## SLIME AND ALGAE

**Santobrite provides low-cost control in cooling water towers**

Operators of large and small cooling water towers find that Santobrite* keeps them free of sluggishness and obstructions caused by slime and algae. Monsanto's Sodium Pentachlorophenate, Technical, it is an inexpensive, effective algaecide—is recommended for use wherever water is not used for drinking or bathing.

The Santobrite treatment is economical because it requires no special equipment of any kind . . . The chemical is simply added to circulating water at any convenient location. Detailed advice on maintaining peak efficiency in cooling operations by means of Santobrite is available on request. Ask for a copy of Monsanto Technical Bulletin O-15.

**New source of**

## SILICON CHEMICALS

**Monsanto English subsidiary expands**

Monsanto's English subsidiary, Monsanto Chemicals, Ltd., has recently purchased control of Silicon (Organic) Developments, Ltd., Bridgend, Glamorgan, England.

The newly acquired Monsanto unit specializes in the manufacture of silicon chemicals, produced from a metal which is extracted from sand. These compounds have a wide variety of uses, including water repellents, golf ball centers, calking strips and electrical insulators. One of the silicate esters, Silester, is important in the precision casting of turbine blades for jet propulsion power units—is also used as a waterproofing compound for cement, brick and stone walls.

Anyone interested in the possibility of utilizing these products in British or European operations is invited to send for full information. Write Monsanto, Foreign Department. *Reg. U. S. Pat. Off.

☆ ☆ ☆

MONSANTO CHEMICAL COMPANY, Desk B, 1703 South Second Street, St. Louis 4, Missouri. District Sales Offices: New York, Philadelphia, Chicago, Boston, Detroit, Cleveland, Cincinnati, Charlotte, Birmingham, Houston, Akron, Los Angeles, San Francisco, Seattle, Portland. In Canada: Monsanto (Canada) Limited, Montreal.

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CHEMICALS AND PLASTICS

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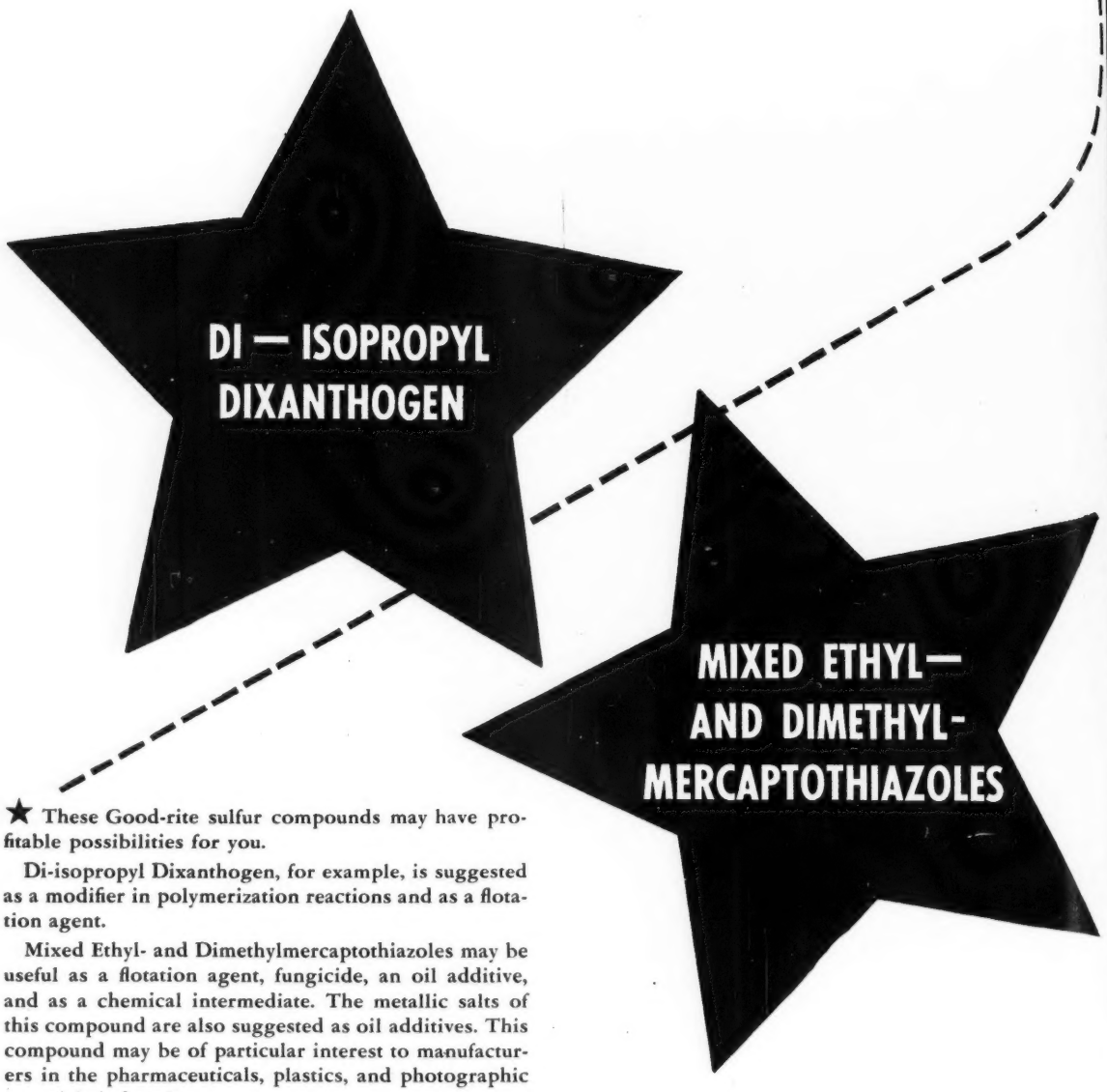
# 2 Good-rite CHEMICALS WORTH NOTING...




★ These Good-rite sulfur compounds may have profitable possibilities for you.

Di-isopropyl Dixanthogen, for example, is suggested as a modifier in polymerization reactions and as a flotation agent.

Mixed Ethyl- and Dimethylmercaptothiazoles may be useful as a flotation agent, fungicide, an oil additive, and as a chemical intermediate. The metallic salts of this compound are also suggested as oil additives. This compound may be of particular interest to manufacturers in the pharmaceuticals, plastics, and photographic materials industries.

Technical men in these, as well as other fields, are invited to send for further information. Both chemicals are available in commercial quantities. Prices on request. Please write Dept. CC-2, B.F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

**B. F. Goodrich Chemical Company**

A DIVISION OF THE B. F. GOODRICH COMPANY

**GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers**

ONYX CHEMICALS OF OPPORTUNITY

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# QUATERNARIES

## KNOWN SAFETY FACTOR

ONYX QUATERNARY AMMONIUM COMPOUNDS

**BTC**
(50% aqueous solution alkyl dimethyl benzyl ammonium chloride)

**TETROSAN 60%**
(Alkyl dimethyl 3,4 dichloro-benzyl ammonium chloride)

**ISOTHAN Q-15**
(Lauryl isoquinolinium bromide)

**ONYXCIDE 75%**
(Alkenyl dimethyl ethyl ammonium bromide)

Chronic toxicity studies of ONYX quaternary ammonium compounds have just been completed by an independent laboratory. ONYX quaternaries are the first to be subjected to these lengthy tests. The published findings serve not only as a guide to you, but also as the basis for your representations to consumers and health authorities.

The ever widening market for ONYX quaternary ammonium compounds indicates their eventual use for many new forms of sanitizing. Already, deodorizing properties of these versatile chemicals have been successfully utilized for the cancer wards of a great hospital . . . a municipal fish wharf . . . a live animal exhibit in the world's largest department store.

To keep abreast of recent developments in quaternaries, you are invited to communicate with ONYX. Not only will copies of the chronic toxicity report be supplied, but suggestions for your adaptation of quaternaries are also offered. We are inclined to think that you, too, will find interesting possibilities in this important group of chemicals of opportunity.

onyx

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Industrial Division Jersey City 2, N. J.
CHICAGO PROVIDENCE CHARLOTTE ATLANTA
In Canada: Onyx Oil & Chemical Co., Ltd., Montreal, Toronto, St. John, Que.

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IT'S TERRIFIC!

## EXTRA ECONOMY

SULFRAMIN E Liquid is the most economical form of synthetic detergent you can buy today. If economy is to be your watchword in 1949—start right now—order SULFRAMIN E and save!

## EXTRA EFFICIENT DETERGENT

Lower cost combined with greater efficiency is like holding aces back to back. Treat yourself to a trial run on SULFRAMIN E Liquid—then relax, secure in the knowledge that your cleaning job will be done more economically and more efficiently.

## EXTRA EASY TO USE

SULFRAMIN E Liquid is delivered ready to use. No dust! No boiling! No stirring! Just open the drum top and dip in—or empty a full load of SULFRAMIN E into your storage tank and pump it, as you need it, through your pipelines to the job.

***AVAILABLE IN DRUMS, TANKWAGONS AND TANKCARS***

TECHNICAL CATALOG ON REQUEST

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*T.M. Reg. U. S. Pat. Off.

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**SODIUM BENZOATE**
U. S. P.

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## PUT THE PLUS

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. . . Constant source of supply.

. . . Production control through uniformity.

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. . . Extensive facilities of 5 modern plants.

2270 years ago, Alexander the Great had conquered the entire civilized world. At the age of 32—as master of the earth—Alexander wept, for there were no more worlds to conquer . . .

So the story goes—but a far more dramatic one has been written by chemistry and its "conquerors", for there are always new worlds to win in the conquest of matter and methods—in the elimination of disease and famine, waste and want. Research recognizes no limitations, with newer and finer chemicals constantly at hand to point the way.

Heyden has always geared its facilities and creative skill to industry and science, offering the maximum in quality, purity and perfection in chemicals. Today, there are very few process industries—from drugs to dyes, perfumes to plastics, rubber to resins, leather to lubricants—which do not use Heyden's finer chemicals—to put the PLUS in their process!

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# HEYDEN CHEMICAL CORPORATION

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*Serving Industry Through Finer Chemicals*

Benzaldehyde • Benzoates • Benzoic Acid • Benzyl Chloride • Bromides
Chlorinated Aromatics • Chlorobenzenes • Creosotes • Formates • Formaldehyde
Formic Acid • Glycerophosphates • Guaiacols • Hexamethylenetetramine
M. D. A. (Methylene Disalicylic Acid) • Paraformaldehyde • Parahydroxybenzoates
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# U.S.I. CHEMICAL NEWS

February ★ A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1949

## Ethyl Ether Continues To Find Widespread Use

Ethyl ether, a versatile compound with many different solvent and chemical applications, continues to find widespread use in a number of industries. While it is not itself a solvent for nitrocellulose, ethyl ether becomes a solvent when used in combination with ethanol. This fact leads to its use for the manufacture of a variety of products derived from nitrocellulose, such as smokeless powder and other explosives; collodions—for medicinal and pharmaceutical use, for photographic work, and for duplicating stencils; and nitrocellulose plastics. Ethyl ether is important as a solvent for fats, oils, waxes, gums, and resins, and as a denaturant in several formulas of specially denatured alcohol. It is used also in the synthesis of organic chemicals, and in the purification of chemicals by extraction and crystallization. U. S. Industrial Chemicals, Inc., long a specialist in the manufacture of ethyl ether U.S.P., produces this important chemical from ethanol of high quality, under rigidly maintained standards of purity.

## New Plastic Compound Is Self-Budgeting Fertilizer

A "self-budgeting" fertilizer, said to supply nitrogen to plants at a predetermined rate over long periods of time, is now being tested. The new synthetic is described as containing urea and formaldehyde. The nitrogen content, reported to be in a much less soluble form than it is in present nitrogen fertilizers, is said to range from 36 to 38 per cent. Changing the ratio of the reactants reportedly changes the solubility of the product, and consequently the rate of nitrogen release. Tests conducted recently indicate that the new material has good physical properties and does not lose nitrogen by leaching.

## *Ultrasensitive Emulsion Records Nuclear Particles*

A new photographic emulsion for recording nuclear particles is said to be so sensitive that its producers are faced with the problem of how to prevent its premature exposure by cosmic rays during shipment to research workers. The new emulsion reportedly has recorded electron tracks ten times longer than those previously captured photographically. Said to come very close to complete recording of any nuclear particle, the emulsion is expected to bring new precision to autoradiography in medical research.

## New Foam Inhibitor

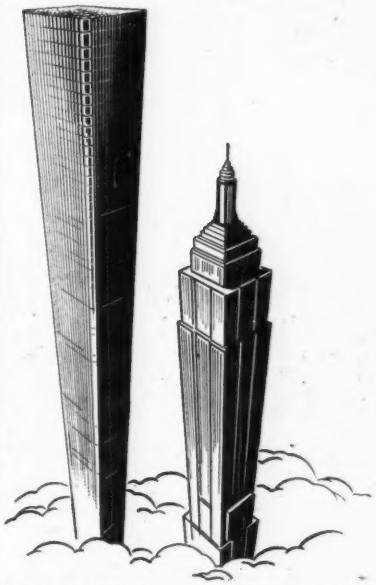
A new product has been developed for suppressing the formation of foam in aqueous systems, according to a patent published recently. The foam inhibiting composition is reported to contain di-tertiary-amylphenoxyethanol, 2-methyl-2,4-pentanediol, and sodium petroleum sulfonate.

# U.S.I. Distribution System Is Extensive—Assures Fast Customer Service

### Closely Linked Production and Distribution Centers Throughout Country Fill Customer Orders Promptly

Few, if any, of the countless users of the chemical industry's diverse line of products ever give much thought to the unseen drama of distribution which is a vital factor in helping to solve today's complex production problems. Yet upon the efficiency of this unobtrusive behind-the-scenes service depends, very directly, the efficiency of the production mechanism of these users.

U. S. Industrial Chemicals, Inc., with plants and distribution centers located strategically throughout the country and linked by a comprehensive teletype hook-up, is in a position to render this distribution service unusually fast and well. Maintaining a fully manned distribution staff, whose full time job it is to cater to customer convenience, the company is able to supply all its customers, wherever they are located, with the right product when they want it. In barges, in railroad tank cars and box cars, and in trucks, U.S.I. products are shipped thousands of miles to warehouses located at many key points—to make these products rapidly available to meet local consumer demand.



**Not a new skyscraper . . . but an artist's conception of how just the gallon cans of anti-freeze (not to mention drums or quart cans) turned out by U.S.I. in one year—would dwarf the Empire State Building if they were stacked in one pile with 2500 cans in every layer.**

### Plants and Distribution Centers

Sensing the growing importance of industrial production in the central and western areas of the United States, U.S.I. estab-

MORE

## *Ethyl Alcohol Treats Asthma in Children*

Children suffering from asthma have been successfully treated by administration of ethyl alcohol intravenously, according to a recent report by two university physicians. Their report is said to be the first description of the use of this therapy in children, although it has received some trial in adults, the physicians observe.

According to the report, the patients—aged two, eight and a half, and ten—had not been benefited by previous therapy with subcutaneous adrenalin. On the day following alcohol treatment, however, their chests were described as much less congested than is usually found following therapy with adrenalin. The children given the alcohol treatment were able to expectorate some of the thick, stringy mucus, the report continues.

The physicians indicate that alcohol can be given to children in relatively larger quantities than to adults, without danger. Only with higher concentrations (10 to 30 per cent of alcohol) do complications such as hemolysis, shock, and decreased urinary output occur, it is reported.

## New U.S.I. Resins Meet Government Specifications

Keeping abreast of recent active buying of paint materials by the government, U.S.I. has developed a number of new resins, each designed for use in particular specifications. New developments include resins for Federal Spec. TT-E-489—Enamel, Gloss, Synthetic; TT-E-485b—Enamel, Rust Inhibitive; Navy Spec. 52-E-13—Enamel, Semi-Gloss, Rapid Drying. There also has been some activity on Army Specs. 3-173 and 3-175, and for both of these there is a U.S.I. resin which will do the job.

## *New Pyrazolone Pigment*

A new pyrazolone pigment, said to be golden brown and to have excellent light-fastness, is described in a recent patent. Ethyl acetoacetate, one of U.S.I.'s many products for the dye industry, is an important intermediate in producing pyrazolone dyes.

ADVERTISEMENT—*This entire page is a paid advertisement* *Printed in U.S.A.*

February ★ **U.S.I. CHEMICAL NEWS** ★ 1949

## *New Cellulose Product Is Flame-Retardant*

A process for preparing a flame resistant cellulose product, claimed to be capable of withstanding repeated wetting with water without substantial loss of its flame-retardant properties, is outlined in a recent patent. The method is said to involve treating the cellulose with an aqueous solution of sodium tungstate, and then with a dilute acid solution of a formaldehyde resin. A water insoluble complex of tungsten with the resin is thereby formed and fixed to the cellulose without curing, the patent asserts.

## Methionine Price Drop Helps Feed Industry

The recent lowering of methionine prices by U. S. Industrial Chemicals, Inc., is expected to increase the market demand for this product in the feed industry. The acceptance of methionine for use in human therapy by the pharmaceutical industry has been responsible for increased production and lower costs of this amino acid. Methionine, it is reported, has broader use applications than some of the other essential amino acids in that it is a strong methylating agent as well as an excellent detoxicant and a synergist for antioxidants.

## *Catalyst Gels Are Dried*

A new process for preparing adsorbent gels from hydrogels by distilling as an azeotrope with butanol is described in a recent patent. The distillation is carried on, it is reported, until the particles no longer agglomerate, after which the butanol is removed from the dehydrated gel.

## TECHNICAL DEVELOPMENTS

*Further information regarding the manufacturers of these items may be obtained by writing U.S.I.*

**A new quick-setting adhesive** for hardwood and softwood, said to set in 10 minutes at room temperatures, has shown ultimate sheer strengths after 24 hours of 4,000 psi., the makers claim. **(No. 414)**

**A new, quick-drying wet primer,** said to give a hard paintable foundation for any type paint, is applicable over wet or dry, clean of rusted metal, including steel, aluminum and galvanizing, the manufacturers state. **(No. 415)**

**Molecular distillation for semimicro analyses** can be carried out on several samples simultaneously, it is reported, in a new high vacuum still. **(No. 416)**

**A new metal-hard finish** is recommended for either dip or spray application to all surfaces subjected to metal-to-metal abrasion. **(No. 417)**

**A new liquid masking "tape,"** said to brush easily onto wood, glass, metal, and similar surfaces, reportedly dries in ten seconds and can be peeled off like tape when paint, lacquer, or other coating has dried. **(No. 418)**

**For maintaining battery efficiency in cold weather,** a new portable device can be stored in the glove compartment, it is reported. **(No. 419)**

**A new special ink for permanent marking** of anything laboratory men may wish to identify, is said to be non-fading, to dry instantly, and to be available in any color. **(No. 420)**

**A new high speed temperature recorder,** said to log as many as 160 separate thermocouple temperatures in succession at a rate of 4 seconds per point, operates an alarm when a preset temperature limit is reached, the makers state. **(No. 421)**

**New replacements for carnauba wax in polishes** for automobiles, wood, leather, etc., are said to be economical and when properly blended to give hardness, texture, and melting point equal to carnauba. **(No. 422)**

**A new dripless, non-clogging valve** for handling pulpy, viscous acid mixtures, can be installed in place of ordinary valves without alteration of equipment, the makers claim. **(No. 423)**

**A new polystyrene composition** for use in products exposed to fairly high temperatures, is said to withstand boiling water, and to have good color stability and low mold shrinkage. **(No. 424)**

## CONTINUED Distribution Is Extensive

lished a number of years ago a manufacturing, storage, and distribution center in Chicago which currently ships out almost 150,000,000 pounds of alcohols, resins, and chemicals every year. To stock this center, U.S.I. products are shipped all the way from Baltimore, Bayonne, Newark, Pensacola, and New Orleans. On the West Coast, the U.S.I. plant at Anaheim, California, doubles as production center and bulk storage point for additional U.S.I. products coming in from the New Orleans and Baltimore plants. The New Orleans plant, producing alcohol, chemicals, and by-products, is a source of supply of U.S.I. products for the Southern and Southwestern States.

Hub of the chemical manufacturing and distribution facilities is the Baltimore plant, serving the entire nation with its varied chemical output—ranging from alcohols to acetoacet-ortho toluidide. The East Coast is served not only with the output of the Baltimore plant, but also with that of U.S.I.'s installation at Newark, N. J. Plants in Pensacola (resins) and Bayonne, N. J. (insecticides and essential oils), distribute their output locally and also ship to outlying distribution points.

U.S.I. has spared no expense to provide equipment equal to the difficult task of coordinating this nationwide distribution network. The pumping facilities alone in the deep-water plants have a capacity which would be adequate to handle the entire water supply of many of our larger cities. The type of barge used by U.S.I. on the inland waterways has the carrying capacity of a 45 tank car train.

The distribution of just one particular product, Super Pyro Anti-Freeze, is an interesting story in itself. Here U.S.I. has the difficult problem of timing the manufacture of millions of gallons of the anti-freeze, procuring and handling containers, and distributing the packaged product to thousands of distributors and dealers — all in a matter of a few months.

### Additional Distribution Facilities

Supplementing the main "distribution points" (such as Chicago, which handles quantity orders — tank car, tank wagon, carload, and truckload shipments), the company maintains an extensive network of "warehouse points." Here U.S.I. products are stocked for quick service in small lots to large and small buyers.

With this nationwide network of plants, distribution centers, and warehouse points, backed by its experienced distribution staff, U.S.I. is in a position to serve its customers promptly, efficiently, and courteously.


# U.S.I INDUSTRIAL CHEMICALS, INC.

60 EAST 42ND ST., NEW YORK 17, N. Y. U.S.I. BRANCHES IN ALL PRINCIPAL CITIES

**ALCOHOLS**
Amyl Alcohol
Butanol (Normal Butyl Alcohol)
Fusel Oil—Refined

**Ethanol (Ethyl Alcohol)**
Specially Denatured—all regular and anhydrous formulas
Completely Denatured—all regular and anhydrous formulas
Pure—190 proof, C.P. 96% Absolute
*Super Pyro Anti-freeze
*Solox proprietary Solvent

***ANSOLS**
Ansol M
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**ACETIC ESTERS**
Amyl Acetate
Butyl Acetate
Ethyl Acetate

**OXALIC ESTERS**
Dibutyl Oxalate
Diethyl Oxalate

**PHTHALIC ESTERS**
Diamyl Phthalate
Dibutyl Phthalate
Diethyl Phthalate

**OTHER ESTERS**
*Diatol
Diethyl Carbonate
Ethyl Chloroformate

**INTERMEDIATES**
Acetoacetanilide
Acetoacet-ortho-anisidide
Acetoacet-ortho-chloroanilide
Acetoacet-ortho-toluidide
Acetoacet-para-chloroanilide
Ethyl Acetoacetate
Ethyl Benzoylacetate
Ethyl Sodiumoxalacetate

**ETHERS**
Ethyl Ether
Ethyl Ether Absolute—A.C.S.

**FEED CONCENTRATES**
Riboflavin Concentrates *Vacatone 40
*Curbay B-G *Special Liquid Curbay

**ACETONE**
Chemically Pure

**RESINS (Synthetic and Natural)**
*Aroplaz—alkyds and allied materials
*Arofene—pure phenolics
*Arochem—modified types
Ester Gums—all types
Congo Gums—raw, fused & esterified
Natural Resins—all standard grades

**INSECTICIDE MATERIALS**
*Pyrenone Concentrates
Pyrethrum Products
Rotenone Products

**INSECTIFUGE MATERIALS**
*Indalone
*Dimelone
Triple-Mix Repellents

**OTHER PRODUCTS**
Collodions Urethan, U.S.P.
Nitrocellulose Solutions DL-Methionine
Ethylene

*Registered Trade Mark

Printed in U.S.A.

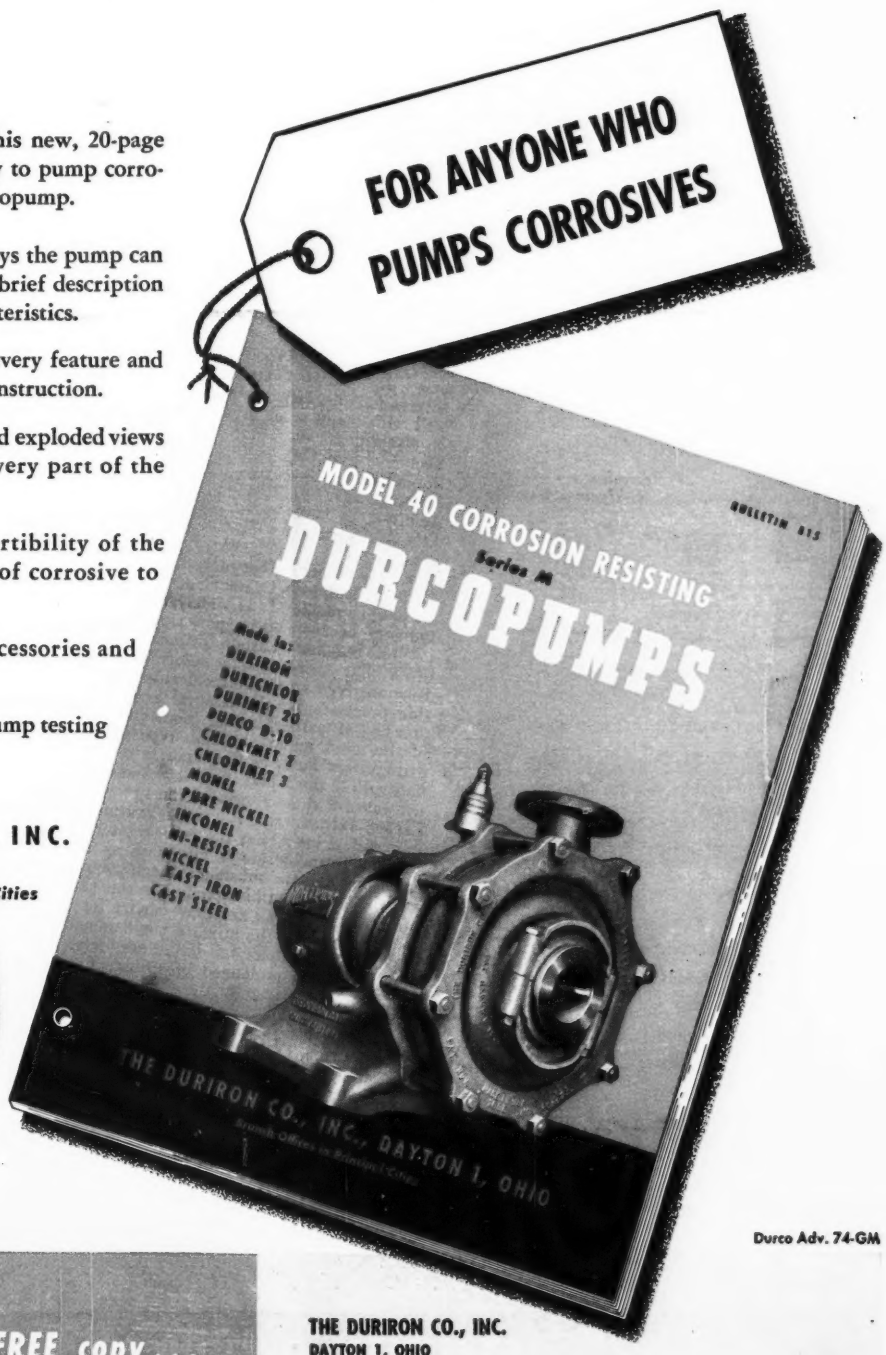
# An Important, New Booklet . . .

Here are the facts about this new, 20-page booklet on the modern way to pump corrosives . . . the Model 40 Durcopump.

- It tells what Durco alloys the pump can be built in and gives a brief description of their physical characteristics.
- It shows and explains every feature and detail of the pump's construction.
- By means of cutaway and exploded views it lets you examine every part of the design.
- It explains the convertibility of the pump from one type of corrosive to another.
- It has a chapter on accessories and modifications.
- It tells about Durco's pump testing procedure.

**THE DURIRON CO., INC.**
**DAYTON 1, OHIO**
***Branch Offices in Principal Cities***

DURCO
CORROSION RESISTING ALLOYS & EQUIPMENT




Durco Adv. 74-GM

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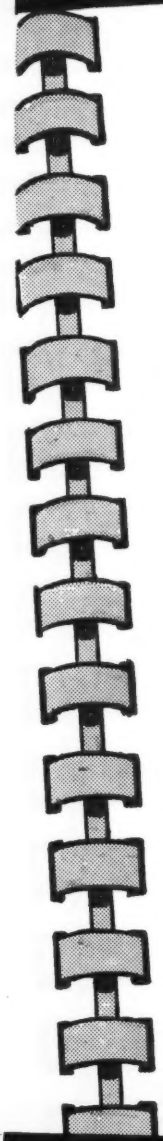
# A page from the Stauffer Catalog

NUMBER THREE IN A SERIES



## Carbon Tetrachloride=99.99%

***Other Names*** . . . . . Tetrachloromethane.
***Formula*** . . . . . $CCl_4$.
***Properties*** . . . . . A clear, colorless liquid, free from suspended material with a pleasant aromatic odor, which boils at 76.7° C. (170° F.) and freezes at —23° C. (—9.4° F.). It has a Sp. Gr. of 1.585 at 25°/4° C. and weighs 13.22 lbs. per gallon or 98.92 lbs. per cu. ft. at that temperature. At 20° C. (68° F.) the Sp. Gr. is 1.596 and weighs 13.29 lbs. per gal. Carbon Tetrachloride is non-flammable, is an excellent solvent for oils, fats, greases and many other organic materials, mixes well with many other organic solvents, and only slightly with water or glycerine.

***Grades*** . . . . . Technical and C.P.
***Analysis*** . . . . . Boiling Range . . . . . 75.8-77.0° C.
Moisture . . . . . No apparent reaction with sodium
Acidity . . . . . Neutral to methyl red
Free Halogens . . . . . nil

| | Technical | C.P. |
|---|---|---|
| Non-Volatile matter not more than . . . . . | 0.0015% | 0.0005% |
| Carbon Bisulphide Content not more than . . . | 0.050% | 0.005% |

***Principal Uses*** . . . . Carbon Tetrachloride is widely used as a solvent in the dry-cleaning industry because of its powerful solvent action and non-flammable nature. Stauffer's Carbon Tetrachloride is especially suitable because of its high purity, thereby assuring quality odorless cleaning.
In industry, Carbon Tetrachloride is indispensable in certain extraction processes for the removal and purification of oils, and for degreasing of textiles, leather goods and metals. Many fire extinguishers of the hand pump or bomb type use Carbon Tetrachloride as the extinguisher fluid, as the vapor in even small amounts snuffs out the flame while the liquid itself is a non-conductor of electricity and cannot cause a short or spread the fire.
Carbon Tetrachloride is a useful raw material of increasing importance in chemical synthesis; the refrigerant Freon is an example.
Carbon Tetrachloride is also used as a fumigant when mixed with other more toxic substances such as methyl bromide, ethylene dichloride or carbon bisulphide. In this case it is itself a toxic material while serving as an excellent carrier for the more powerful toxicants and also renders the mixture non-flammable.
Caution: The vapors and liquid are toxic. Use with adequate ventilation and avoid prolonged breathing of the vapor and contact of the liquid with the skin.

***Packing*** . . . . . 

| Capacity | Vol. in Gals. @ 68° F. | Net Weight in lbs. | Gross Wt. in lbs. |
|---|---|---|---|
| 5 gal. drum S.T.C.* . . . . . | 5.0 | 66.5 | 74.5 |
| 55 gal. drum S.T.C.* . . . . . | 52.5 | 700 | 760 |

* Non-Returnable.

***Shipping Regulations*** None.
***Stocks*** . . . . . Berkeley, Brooklyn, Baltimore, Boston, Charlotte, Chicago, Cleveland, Dayton, Detroit, El Monte, Indianapolis, Lockland, Los Angeles, Milwaukee, North Portland, Philadelphia, Pittsburgh, St. Louis, San Francisco, Stege.
In addition to the above, we also have distributors located in leading industrial cities. A comprehensive booklet on Carbon Tetrachloride, its properties and uses is available upon request.

## STAUFFER PRODUCTS

DDT—(Dichloro-Diphenyl-Trichloroethane)
BHC—(Benzene Hexachloride)
2, 4-D (Acid, Isopropyl Ester, Amine Salts)
Toxaphene—(Chlorinated Camphene)
Borax
Boric Acid
Tartaric Acid
Citric Acid
Titanium Trichloride
Carbon Bisulphide
Carbon Tetrachloride
Caustic Soda
Chlorine
Silicon Tetrachloride
Sulphur
Sulphur Chloride
Textile Stripper
Sulphuric Acid
Sodium Hydrosulphide

Stauffer CHEMICALS SINCE 1885

## STAUFFER CHEMICAL CO.

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## PAINTS AND VARNISHES

Pine oils are used in the paint and varnish making industries as special solvents in alkyd and phenolic resin formulations, as wetting agents and levelers for baked enamels, dispersants for grinding pigments, and as anti-skinning agents. Pine oil is also used as a preservative, wetting agent, and anti-foam agent in casein—and water-emulsion paints.

## DISINFECTANTS

High in terpene alcohol content, Hercules Pine Oils are widely used in disinfectants. They are effective, low in cost, safe and easy to use, have a pleasing piney fragrance, long-lasting disinfectant action, do not stain.

## MINING

In the mining industry, Hercules Pine Oils are used as frothing reagents in the flotation process. Low in cost, pine oils are effective frothers for the flotation of sulphide minerals—especially where a highly mineralized froth is required. Pine oils are also employed in the flotation of coal, potassium chloride, and talc.

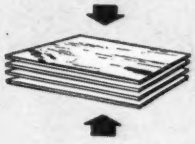
## PAPER

Pine oils diverse properties are responsible for their wide acceptance in the paper industry. They are used as anti-frothers, casein preservers, and as wetters and spreaders in coating operations.

*HERCULES*

# PINE OILS

## IMPROVE MANY PROCESSES AND PRODUCTS



## PLYWOOD ADHESIVES

Pine oils are used as anti-foaming agents, wetting agents, and protein preservatives in plywood adhesives. They perform a similar function in adhesives based on glue, casein, and starch.

## YOUR INDUSTRY

Hercules Pine Oils have application in many other industries, such as the textile, soap, cleaners, drug, leather, rubber, and laundry industries. Possibly pine oils have new and desirable applications in your industry? Why not send for literature and testing sample?

*HERCULES*

*HERCULES POWDER COMPANY*
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992 Market Street, Wilmington 99, Delaware

Please send me information and testing samples of pine oils for evaluation in_____

NAME_____

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COMPANY_____

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NPD-1

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$CH_3$-$(CH_2)_n$-$CH_3$

# NORMAL PARAFFINS

## OF HIGH PURITY

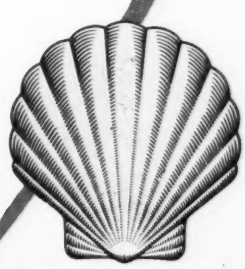
| TYPICAL ANALYSES | | | | |
|---|---|---|---|---|
| | $C_{12}$-$C_{20}$plus | $C_{12}$-$C_{14}$ | $C_{15}$-$C_{17}$ | $C_{18}$-$C_{20}$plus |
| Specific Grav. 20/4°C | 0.774 | 0.760 | 0.773 | 0.778 @ 35/4°C |
| Color, Saybolt | Water-white | Water-white | Water-white | Water-white |
| Melting Range, °F | 40-55 | 15-25 | 45-55 | 80-90 |
| Bromine No. | 0.1 | 0.1 | 0.2 | 0.1 |
| Dist.: IBP | 450 | 428 | 496 | 576 |
| FBP | 657 | 491 | 553 | 692 |
| n-Paraffins, vol. % | 95 plus | 95 plus | 95 plus | 95 plus |

● Normal paraffins ranging from $C_9$ to $C_{23}$ are now offered by Shell Chemical for your evaluation. These products vary in physical state from water-white liquids to low-melting point solids, and are essentially free of unsaturated hydrocarbons.

Sample quantities are now available in the ranges of $C_{12}$ to $C_{20}$, $C_{12}$ to $C_{14}$, $C_{15}$ to $C_{17}$, and $C_{18}$ to $C_{20}$.

These normal paraffins are suggested as intermediates for the manufacture of detergents, plasticizers, halogenated hydrocarbons, and other products. *A letterhead request will bring samples and further technical information.*

● Among the many products marketed by Shell Chemical are Acrolein, Methyl Ethyl Ketone and Secondary Butyl Alcohol.



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# Meet Competition

## with new ideas using Ethylene Amines

Competition is consistent. It's always demanding that you come up with a completely new way of doing things—or an improved product for the old way. Now, you can find all kinds of low-cost ideas to help your business with these ethylene amines:

| | |
|---|---|
| Ethylene Diamine | $H_2NC_2H_4NH_2$ |
| Diethylene Triamine | $H_2N(C_2H_4NH)_2H$ |
| Triethylene Tetramine | $H_2N(C_2H_4NH)_3H$ |
| Tetraethylene Pentamine | $H_2N(C_2H_4NH)_4H$ |
| Aminoethyl Ethanolamine | $H_2NC_2H_4NHC_2H_4OH$ |

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Ethylene diamine reacts easily with a wide range of both organic and inorganic materials. And its low equivalent weight gives you maximum efficiency in these reactions. All five ethylene amines are used to make glyoxalidines that have a dual nature—one end of the amide molecules is water-loving, while the long, fatty chain orients itself towards oily substances only.

From aminoethyl ethanolamine comes Amine 220, the glyoxalidine used as a tar emulsion breaker in the water gas industry. Diethylene triamine is the starting point for new asphalt additives necessary for making water-resistant, asphalt-stone roads.

***Meet competition. Start with these ideas for bettering your present product with ethylene amines and look into the new possibilities they suggest. A note or call to any Carbide office will give you the details.***

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*new*
*office*

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# Chemical Industries

THE MAGAZINE OF THE CHEMICAL PROCESS INDUSTRIES

Newsletter,

February, 1949

For Your Information:

Tennessee Eastman Corp. is scouring the Southwest for an "organic chemicals" plant site. Acetylene from natural gas is understood to be the aim—presumably as an intermediate for production of acetaldehyde, acetic acid and acetic anhydride for the company's cellulose acetate operations at Kingsport, Tenn.

This month Armour & Co. becomes the first large-scale producer of secondary fatty amines. It has started regular production of two of these, derived from cocoanut oil and hydrogenated tallow, as well as their quaternary ammonium derivatives. The company is also building a $6-million plant at McCook, Ill., for manufacture of fatty acids and their derivatives, completion of which is expected late this year.

* * CI * *

Nylon-coated paper, now in the experimental stage for various packaging uses, shows an amazing resistance to tear and puncture. It is being tried in several types of paper bags for shipment of chemicals, may eventually mean thinner, lighter-weight industrial packages.

Secret of a large Eastern company's new floor wax that has the trade buzzing is the high percentage of shellac in the formula. Whereas 20 per cent of the solids has heretofore been considered the maximum shellac content that could be employed without loss of gloss, the new product boasts a high gloss with 80 per cent. All this shellac makes the wax about as expensive as carnauba-based formulations, but its sales appeal (clarity and water-thinness that makes it easy to apply) has cut into competitors' markets. One big disadvantage: Its water solubility will prevent its getting by many association specifications.

* * CI * *

The introduction of new fluorine-containing compounds has been so rapid that it has produced a jungle-like growth; but a program now under way at Armour Research Foundation has as its object the correlation of chemical and physical properties brought about by substitution of fluorine in known compounds containing a variety of functional groups. One practical objective: development of plastics, of intermediate stability, containing less fluorine than Teflon and Kel-F.

Something new in waxed paper is now being sold in Eastern markets; Wax-Seel, product of Munising, Chicago. The outside is heavily waxed, but the inner side is coated with a pressure-sensitive adhesive that sticks only to itself. Moisture- and odorproof, its self-sealing feature makes it ideal for wrapping food leftovers, fruit, vegetables, sandwiches and the like.

* * CI * *

Some apple trees will receive nitrogen fertilizer by a completely new route this next growing season. E. I. du Pont de Nemours & Co. will start distribution of "NuGreen" fertilizer compound—containing 43 per cent nitrogen as urea—in selected Northern and Eastern apple-growing areas. It will be applied in solution as a spray on the leaves and can be used in pest-control solutions without affecting their activity. This method of application is said to equal or surpass in efficiency the usual soil-treating methods. Trials on other crops are now under way.

This use, together with the market for urea as a protein supplement in cattle and sheep feeds (CI, December 1948, p. 941), should absorb a sizable portion of Du Pont's increased urea output at Belle, W. Va., capacity for which has more than doubled within the past year.

Solvay Process Division of Allied Chemical & Dye Corp. is expected to bring in a large urea unit sometime this year. This and Du Pont's expansion will almost triple previous capacity.

* * CI * *

Tennessee Valley Authority will complete a $200,000 fluorine recovery unit at its Godwin, Tenn., phosphate sintering plant by June 1. Exit gases from the sintering operation are passed through a limestone-packed tower. Synthetic fluorspar (calcium fluoride) is withdrawn from the base and fresh limestone is added at the top. The system is not only expected to pay for itself, but to produce a small profit.

Buffalo Electro-Chemical Co. is negotiating with the Port of Vancouver (Wash.) for a 46-acre plant site. It has been reported that hydrogen peroxide is the contemplated product.

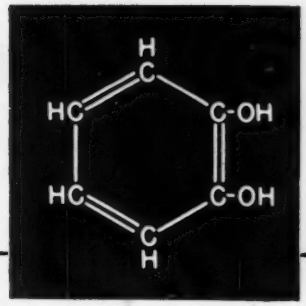
* * CI * *

Here and There:

Enjay Co. is considering expansion of its iso-octyl alcohol production at Baton Rouge, La....Dominion Alkali & Chemical Co.'s caustic-chlorine plant near Beauharnois, Que., has started operation. The plant, built by H. K. Ferguson Co., employs the Krebs mercury cell...Present market situation of paradichlorobenzene is making rough going for the now-more-costly naphthalene in the moth-ball market...An interesting process for making monochloracetic acid, intermediate for 2,4-D and carboxymethyl cellulose, is covered by a patent (U. S. No. 2,455,405) assigned to Du Pont: ethylene chlorohydrin is oxidized with nitric acid... Incidentally, Hercules Powder Co. has increased carboxymethyl cellulose capacity twice during the past year to meet food processors' demands... Insecticide makers have another worry in addition to present dullness of business: Stocks are so low all along the line that any sudden orders may snowball into a sharp demand, thus causing embarrassing shortages... Shell Chemical Corp. is now manufacturing para-xylene, terephthalic acid intermediate, in a semi-commercial unit...Commercial production of Hercules Powder's Rosin Amine D is forthcoming this Spring.

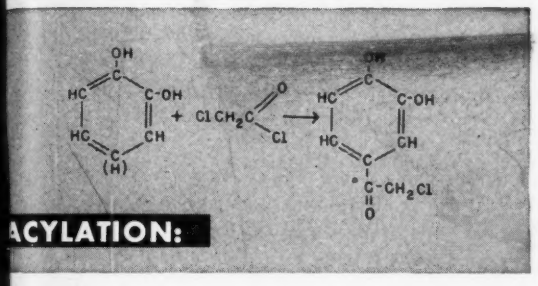
The Editors

# KOPPERS Catechol



(ortho-Dihydroxybenzene)

***An industrially important dihydric phenol—***
***Available in commercial quantities***



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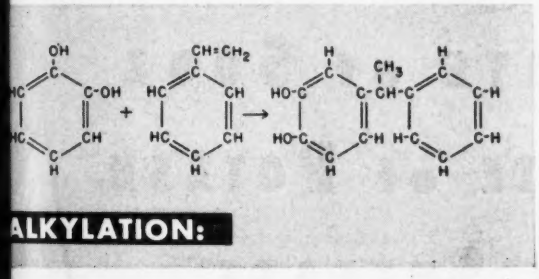

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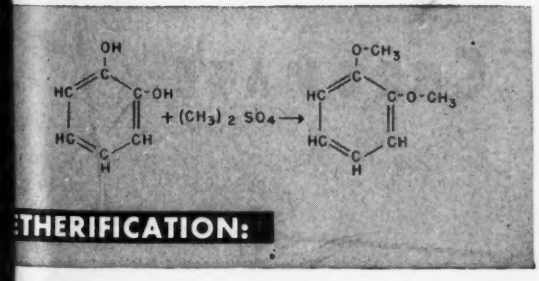

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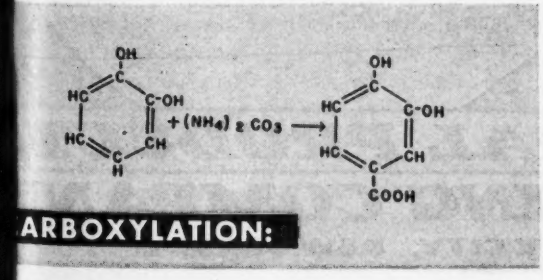

CARBOXYLATION:

● Catechol is used in quantity by the photographic, dyestuffs, pharmaceutical, fur dyeing, and fine chemicals industries. This important industrial chemical is available from Koppers in two grades—C.P. and Resublimed. Specifications are as follows:

| | C. P. | RESUBLIMED |
|---|---|---|
| Purity, min. | 99.0% | 99.6% |
| Freezing Pt., min. | 103.5°C | 103.8°C |
| Appearance | White Granules | White Crystals |
| Non-Volatile, max. | 0.05% | 0.05% |

Requests for samples and additional information relative to prices, availability, and properties should be addressed as shown below.

**KOPPERS COMPANY, INC.**
*Chemical Division*
**Pittsburgh 19, Pa.**

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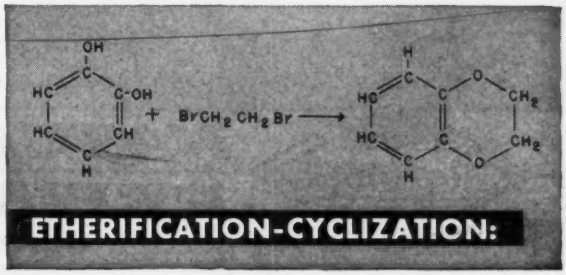

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# PRODUCT DEVELOPMENT TO THE FORE

*by* ***ROBERT L. TAYLOR, Editor***

FEW TECHNIQUES in the business of making and selling chemicals have changed as much over the past decade as that of introducing new chemical products. Yet the science of "commercial chemical development," as it has come to be known, is still young.

***Instances still occur*** where the commercial development of a new chemical consists of calling in a promising young salesman, handing him a sample and a laboratory report, and bidding him luck with some such inspiring comment as: "This looks like a good product, Bill. It ought to have a good market, so let's see what you can do with it."

If it doesn't go, either Bill or the product is blamed. If it goes, the product is "good" and Bill works himself into a better job.

Usually no one in such cases, with the possible exception of Bill in his "spare time," has made the slightest investigation of how big the market for the product actually is, what things are likely to affect its price, the extent and effect of possible demand fluctuations, the nature of possible new markets, the availability of raw materials, and a host of similar factors, any one of which could spell the difference between success and failure for the venture.

Fortunately, this method of new product development is disappearing. During and since the war, most chemical companies have made significant strides in the use of modern market research and sales development techniques. The guesswork is being taken out of new chemicals.

***And well it might.*** The number of new chemicals offered in the years since the war has been more than double that of any similar prewar period. And despite eager-and-waiting markets, competition has been keen as representatives have regaled prospective customers to "try this" and "try that."

Product development procedures now being used by leading chemical companies were discussed at a recent meeting of the Commercial Chemical Development Association and are reported on page 208 of this issue. It is evident from a reading of this report that the introduction of a new chemical has become a highly specialized and organized business. Every idea is put through an obstacle course of technical research, market evaluation, raw material investigation, process evaluation, patent searches, application testing, and field checks.

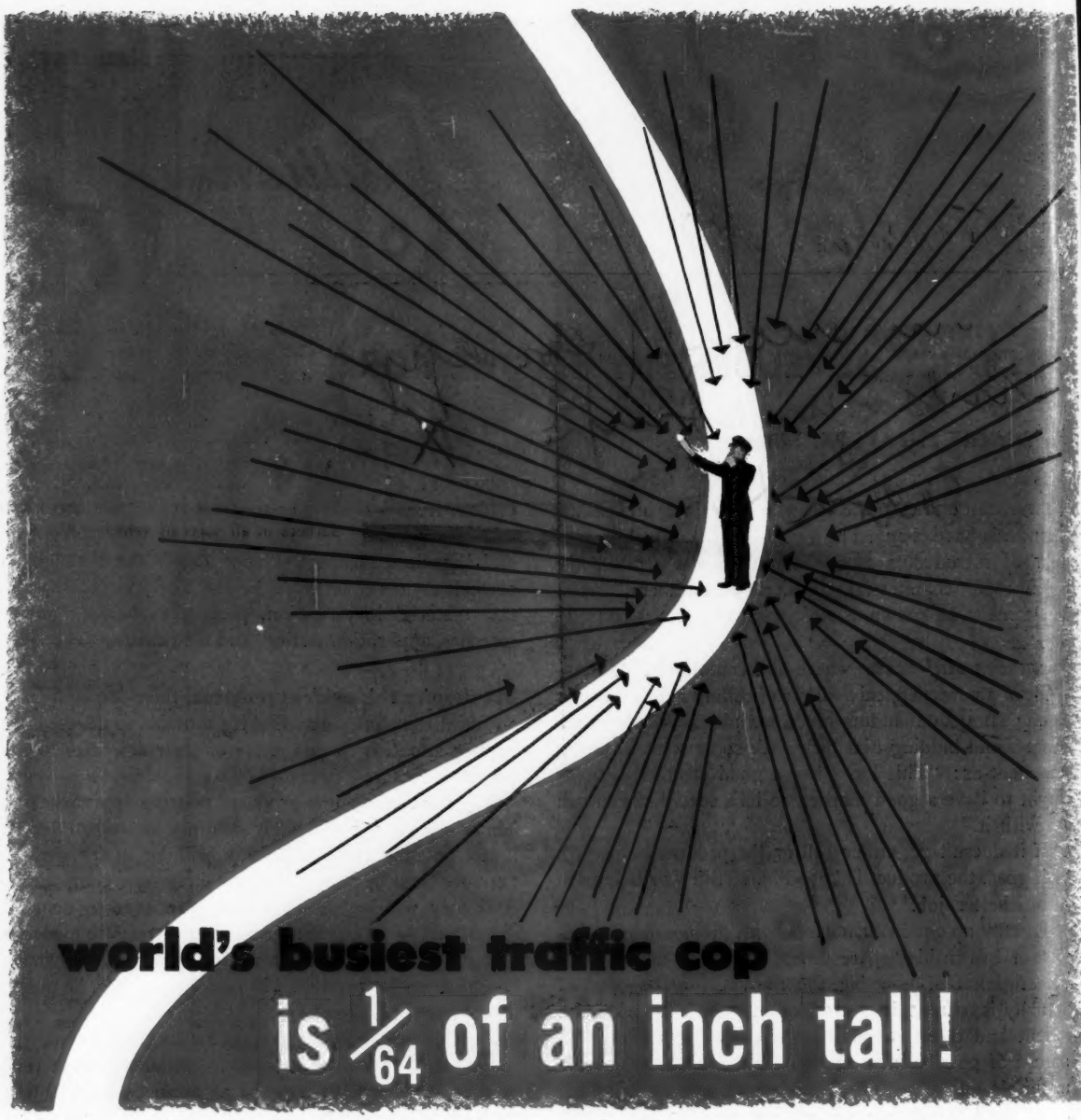
***But despite this evident progress,*** there are signs that chemical companies may find it profitable to devote even greater attention to this phase of their activities in the future.

The number of new products pouring from research laboratories will most likely continue at record levels, if not actually increase. Users will be under greater pressure than ever to try all of these new compounds. And they will be more inclined than ever to demand that sellers be armed with some pretty concrete evidence that it will be worth their while if they do. To make the grade a new product will not only have to be good; it will have to prove it.

At the same time, as competition increases, errors in judgment will be more costly. Initial evaluation of product ideas will have to be as accurate as scientific methods and experienced people can make them. It is just as important that worthless development expenditures be avoided as that no profitable opportunities be overlooked.

In order to do all this some companies may find it necessary to increase their product development manpower. It would not be surprising to see a trend in chemical company organization charts to consolidation of the functions of market research, sales development and application research into a single unit carrying some such name as commercial development department, with status equal to that of the research and sales departments. Several of the larger companies already have what amounts to such a set-up.

But whatever form it takes, commercial chemical development appears destined to play an increasingly important role in chemical industry growth and prosperity. Those individuals and companies who wish to keep pace would do well to recognize this now.



# world's busiest traffic cop is 1/64 of an inch tall!

That thin band of paint running down the middle of the highway is the world's busiest traffic cop. It talks to motorists night and day, telling them when to stay on their own side of the road and when they may pass other cars. It saves lives, keeps traffic orderly on America's most heavily travelled highways.

To do its job right, it must cover asphalt perfectly, without "bleeding," so that it can be seen clearly at all times; it must not yellow or darken under sunlight, or wash away in rain, snow or sleet; it must dry rapidly without leaving tracks from speeding tires. Above all, it must be able to stand up under the grinding punishment of 50-ton trucks and trailers month after month without cracking or wearing away.

CSC butanol, butyl acetate and dibutyl phthalate help make America's highway markers the toughest as well as the busiest traffic cops in the world. In lacquer formulations these CSC solvents and plasticizers produce the smoother, tougher, easier-to-apply finishes that reflect your products' quality.

If you manufacture lacquers, we suggest that you re-evaluate your lacquer formulas and see what CSC butanol, butyl acetate and dibutyl phthalate are doing or can do for you.

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COMMERCIAL SOLVENTS CORPORATION

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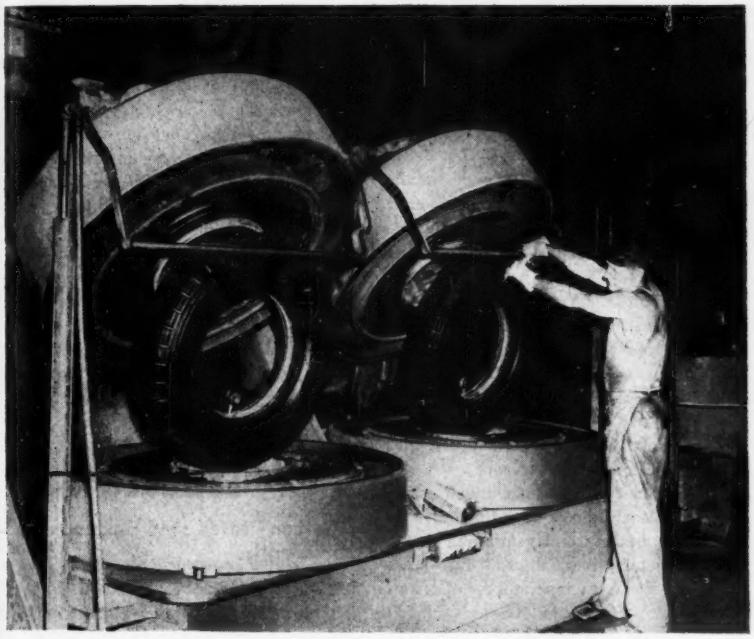
# What's new



SILICONES: Chemical centaurs gallop far.

## SILICONIA WIDENS DOMAIN

**Silicones have come a long way since the war, but the industry is still just feeling its oats as increased demand for new applications promises lower costs.**

BESPECTACLED CHEMISTS probably think first of Sight Savers—Dow Corning Corp.'s silicone treated tissues for cleaning glasses—when silicones are mentioned. Any one of 7,500 industrial users thinks of some technical headache he has cured with their unique properties: stability, flexibility, resilience, water repellency and lubricity over a wide range of temperatures. And every day this number is growing as these chemical centaurs, that are midway between conventional organics and typical inorganics, perform jobs better than old materials and make new processes possible.

General Electric Co. and Dow Corning Corp., the two pioneers in the field, began producing silicones for military purposes during the war (*CI, Oct. 1945, p. 638, and Aug. 1948, p. 220*). Recently they have been joined by Linde Air Products Co., which has four organosilicon chemicals in the pilot-plant stage. These are being marketed as intermediates to be processed further by the purchaser. Dow Corning and General Electric also sell a line of such chemicals, but this is often forgotten in the light of their more spectacular silicone products.

### Viscous Damping

One of the more glamorous "firsts" for silicone oils is their role in lifting viscous torsional vibration dampers out of the realm of engineering dreams and into heavy Diesel engines and several models of Ford and Packard cars. The relatively constant viscosity of these fluids over a wide temperature range in combination with their high shear stability provides a long-awaited material to check crankshaft whip. Now engine vibration at critical speeds can be eliminated, and smoother rides are ahead for motorists.

Although the damping is on a much smaller scale, similar properties are exploited in ammeters, gas gauges and speedometers to bring needles to rest quickly.

Hydraulic systems in aircraft are utilizing these oils to prevent "frozen" landing gears and wing flaps when the mercury drops as low as —70° F. Shock absorbers in all sorts of vehicles also must run the gamut of climatic conditions, and here, too, silicone oils, which do the same "absorbing" from —120° F. to 575° F., are the answer.

Added to this remarkable indifference to high and low temperatures alike are moisture resistance and excellent dielectric properties. These mark the oils as definitely superior to other dielectric liquids, and they are finding wide use in transformers and capacitors where optimum performance and maximum life are required.

As lubricants where rolling friction rather than sliding friction is involved, silicones match most non-additive petroleum oils up to 200° F., and at higher temperatures, are better. They are the best lubricants for natural and synthetic rubber and for polystyrene, phenolics and most plastics. Great expansion is taking place in their use for lubricating synchronous motors, precision machinery, instruments, plastic- or rubber-coated wire being drawn through conduits, oven clocks, toaster timers, and other precision instruments exposed to heat and moisture. Conveyor systems consume less power when silicones lubricate the rollers, and silicone-lubricated parking meters keep motorists honest in all seasons.

### Mold Lubricants

In their short history, silicone emulsions and oils have already become standard mold lubricants in the rubber industry, where they have speeded production, improved product appearance, and reduced number of rejects. Their low surface tension enables them to wet mold and die surfaces readily, penetrate the smallest cavities. They can be applied to hot molds without decomposition or danger of flashing, and their stability keeps molds clean much longer than other materials.

Solutions are generally used for bead and parting line release of heavy duty tires, for deep draw molding of plastics,

and for rubber tile. Emulsions find favor for most tires, mechanical rubber goods and some plastics.

Akin to these materials is a silicone compound that is gaining popularity as a release agent for plywood. A thin coating rubbed onto press platens prevents adherence of resins and glues exuded from the veneer and adhesive charge. One application prevents sticking of plywood for as long as 6 months of continuous production and eliminates undue strains on press loading equipment.

### High or Low

Whether the temperature drops to —70° F. or zooms to 450° F., silicone greases can be counted on to maintain a consistency that insures protection of parts. Moreover, they are not affected by water or live steam, and resist many corrosive chemicals while they themselves are not corrosive. G-E's are used mostly for plug cocks and valves, but greases for bearings of high temperature rotary equipment are expected.

Dow Corning has three that make use of these properties. A typical application is for bearings of a conveyor system that runs through a paint spray booth, an air dry booth, and then an oven at 450° F. Another grease with almost indefinite stability as the lubricant for ball bearings rotating at 20,000 RPM at from —40° F. to 350° F. is being used in such permanently sealed systems, as well as for toasters, solenoid plungers, and electric shavers. The third is responsible for the all-weather operation of portable recording machines, wind velocity and direction indicators, and aircraft bearings—a very important potential market.

### Insulating Varnishes

Silicone electrical insulating varnishes in combination with inorganic insulating materials have been responsible for 50 per cent reductions in size and weight of electric motors, transformers, and solenoid coils. Their heat stability, waterproofness, non-volatility and good dielectric properties have prolonged life under adverse conditions, given greater freedom from overload failures, reduced fire hazard and increased horsepower output per unit weight.

As vehicles for heat and weather-resistant coatings, Dow Corning's silicone resins pigmented with aluminum are being used on motorcycle cylinders and exhausts by one of the country's largest manufacturers. After two thousand miles of rough driving, the finish looks as good as new. A similar coating is being used to protect hot metal surfaces (up to 1,000° F.) such as stacks, boilers, and exhaust mufflers.

Porcelain may find a competitor in silicone coatings that are more chip-resistant, can be used with a lighter sheet steel, resist most foodstuffs, and don't yellow or chalk.

Among coatings, Dow Corning's Pan Glaze is one that has revolutionized the baking industry by eliminating the need for greasing pans before each baking cycle. One coating is good for 100 to 200 bakes, but the big economy is in better bread, no spoilage because of rancid grease, freedom from grease fumes, and reduced labor costs. A similar product for the retail trade, Pantastic (*CI, Jan. 1949, p. 36*), offers greaseless frying and ease in cleaning pans.

### Rubbers

The same heat characteristics of other silicone products is exhibited by silicone rubbers which retain flexibility from —70° F. to 500° F.—far below and above limits for organic rubbers. In addition, they are resistant to hot oils and most chemicals, resist weathering and oxidation, and have excellent dielectric properties. Either alone or in combination with glass cloth, they are being fabricated into gaskets, reinforced hoses, heater ducts, and laminated electrical insulation.

In airplanes, such products withstand continuous operating temperatures of 35°-400° F. in heating and ventilating ducts, while in jet engines, silicone duct seals stand up under temperatures of from —89° F. to 450° F. at pressures of 150 psi. Asbestos is being replaced by them for oven and searchlight seals. In heat sealers for making bags, G-E silicone rubbers are giving ten times the wear of regular rubbers in staying soft and flexible at temperatures over 300° F. They make ideal seals for small liquid capacitors, and their all-around resistance makes them good seals and gaskets for chemical processing equipment.

### Water Repellants

One of the earliest products to make use of the outstanding water repellency of silicones was a waterproof and water-repellent dielectric paste. G-E's Dri-Films are materials that upon application polymerize to give a sub-microscopic film of water-repellent silicone to ceramics, textiles, glass, plastics and paper. Dow Corning's product recently developed for hydrophobing textiles provides a treatment that is extremely resistant to dry cleaning and only moderately affected by laundering. Resistance to soiling and spotting is an added dividend.

Still other silicones finding application in a wide number of industries are Dow Corning and General Electric antifoam agents. Among the fields in which these viscous compounds are being used successfully are adhesives; paints, varnishes, and lacquers; pulp and paper; polishes and waxes; rubber and latices; soap and detergents; and flake caustic soda. Quantities required vary from a few parts per million in most food processing applications to 5,000 parts per million in some synthetic latices.

### Growing Every Day

Like a new father's offspring, the accomplishments of silicones seem to be nonending. However, such babies as these don't come along every day even in the chemical industry famed for its procreative powers.

Right now the youngster may seem a bit expensive to have around at $2 to $6 a pound, with some special fluids running up to $20 a pound. But initial cost is misleading, for the extra money is returned many times in increased life, decreased maintenance, improved performance and simplified design. As more industries find they can't afford not to afford silicones and the market broadens further, this apparent high price will lower, too.

## SLICK DESLICKER

**Carbon-coated sand sinks oil slicks permanently.**

BACK IN 1945, a serious fire caused by a welder's sparks falling on a floating oil slick caused great damage at the U. S. Naval Shipyard at Norfolk, Va. The Navy got busy, set chemist Irvin Baker to work on a solution that would be easy, cheap, fast and permanent.

The answer turned out to be a carbonized sand now commercially available, made by mixing a fine sand with an organic solution and roasting in a kiln. Details of the process are still a secret, but

IRVIN BAKER: Business built on sinking sand.

the processing beyond the roasting is simple. The Carbosand, as the material is called, is sprayed gently on the slick by means of compressed air. Then agitation by a water stream sinks the sand, which carries the slick along with it to the bottom of the sea.

**Theory Down to Earth**

Carbosand is simply a practical application of physico-chemical fundamentals. The sand is an inexpensive, inert, heavier-than-water vehicle. The carbon coating does the trick, for it loves oil and hates water. If a particle strikes the slick, the oil is adsorbed and a suspension of oil-coated sand in water is formed. (If a particle strikes "bare" water, however, it floats until it comes in contact with oil.)

The sand-oil suspension floats until agitation—by a water hose, for example—causes the suspension to sink. More important, it stays sunk. A laboratory specimen has stayed on the bottom for two years, and occasional violent agitation fails to dislodge the oil from the sand.

**Costly Hazard**

The presence of floating slicks, caused by spillages of petroleum products or other lighter-than-water non-miscible organic liquids, is a hazardous problem in most waterways. Most of them are highly flammable and are responsible for high insurance rates levied on waterfront areas.

From the water surface they spread to waterfront structures, polluting beaches, piers, pilings, and ships' sides. These waste products, purposely or inadvertently dumped into waterways, damage and kill life below the surface as well as above. Petroleum products, for example, were not generally regarded as poisonous to marine life until recently, when studies revealed that oil constantly emulsifies in water and kills the minute marine life upon which fish must live.

**Big Opportunity**

Thus, there are a lot of people—owners of vessels, shipyards, oil companies, and factories on waterways; bridge builders, salvage operators, and harbor authorities—who must concern themselves with the problem.

As a result, Carbosand Corp., which has been making the material exclusively for the government, is now making the product and process available to port authorities and commercial interests. It is also increasing production capacity and service engineering staffs so that it will be able to handle the demands of all major American ports. Baker is chief chemist of the organization.

A large plant has already been built on the East Coast. Similar expansion programs are under way on the Gulf and the West Coast, with the goal of producing at strategic points sufficient quantities of Carbosand to provide not only day-by-day requirements, but also to build up a stockpile in its sand silos for any major harbor emergency.

# TIN CAN FIREMAN

**First beer can fire extinguisher has designs on virgin market.**

A BEER CAN no longer calls to mind an amber liquid topped with foam, bitter to the taster but nectar to the tippler. Over the last few years, sacrilegious insecticide manufacturers in search of efficient and cheap containers have used beer cans to dispense first aerosol insecticides, then odor killers, lacquers and cosmetic sprays. Now the first cheap pressurized fire extinguisher aimed at the mass market represented by the 60 million homes and 40 million cars and trucks in this country completes the desecration of this once idyllic picture. It too is housed in a beer can.

Bostwick Laboratories of Bridgeport, Conn., is the villain or hero of the piece. The company has no doubts which, for it has named its product Hero.

**From Insects to Fires**

Hero is the natural outgrowth of Bostwick's activities and the ingenuity of Ed Helfer, vice-president in charge of production for the Connecticut Chemical Research Corp., of which Bostwick is a wholly-owned sales subsidiary. Like every one else in the aerosol insecticide game, the company has been on the lookout for new fields of application for its "know-how", both to expand business and to level off seasonal variations. Recent additions of deodorant and plastic aerosols had increased its aerosol line to five items when Helfer hit upon the idea of a cheap one-shot pressurized fire extinguisher.

Carbon tetrachloride propelled by carbon dioxide is the material that puts the fire out. A Continental beer can has a hole cut out of the top and Bostwick's nozzle assembly (patent applied for) soldered in place. This is essentially a tube through which carbon tetrachloride is forced from the bottom of the can when the nozzle is opened. The can is filled with a pound of the carbonated extinguisher fluid, and the bottom is closed with a double seam. The contents, under a pressure of 40 psi at 70° F. are released by lifting a ring set in the top of the can and pulling back to break the spout. The stream, which lasts for 18-20 seconds, can be directed at any fire within a distance of 12-15 feet.

E. HELFER: A Hero is born.

Although carbon dioxide is a fire extinguisher in its own right, that property is not the reason for its selection as propellant. With compressed air as the propellant, there is a very sharp pressure drop as the contents are discharged. Carbon dioxide, being soluble in carbon tetrachloride, gives a steady stream and complete emptying of the can.

**Price the Factor**

Pressurized extinguishers are by no means new, nor is the idea of selling extinguishers for home use. Up to now, however, even the smallest of the conventional refill types cost about $4, with refills at about $1.85. There are available a few brands of disposable extinguishers other than Hero, but these are in the $2.49-2.75 range. Bostwick's sells for $1.29, or three for $3.80.

The company makes no claim that its product is better than other disposable extinguishers on the market—only cheaper. However, it is confident that competitors, who use steel brazed containers, can't match its price nor its production of 10,000-15,000 units a day. A semi-automatic filling process, soon to be automatic, which is both the secret and pride of Bostwick, is responsible for this high output.

**Broad Market**

Bostwick's big market will be the 98 per cent of homes that have no fire extinguisher at all. Since over 92 per cent of fires start small, it is obvious that a good proportion of fire loss could be prevented by having an extinguisher ready for instant use. The company feels that people unwilling to part with $4 to $15 for an extinguisher that requires checking and refilling will buy its $1.29 can to nip all kinds of fires in the bud.

Although brackets are furnished with

each extinguisher, one of the big selling points is that Hero can be tossed into the glove compartment of a car or the drawer of a table or cabinet in the house. Some fire authorities and manufacturers of conventional extinguishers feel that having just 16 ounces of fire fighter around at various locations gives a false sense of security. Others, while admitting that these are not the answer in public buildings or factories where fire protective equipment is required by law, feel that it is ideal for the use intended. They hope to see Underwriters Laboratories, which does not test extinguishers of less than one quart capacity, change standards to test and approve it.

When Bridgeport, the home of Hero, was blanketed with the product recently, Bostwick was convinced it had brought out another product to meet a demand that had never been satisfied. Since then it has expanded throughout New England, dispensing its cans through groceries, gas stations, garages, hardware stores, drug stores, and department stores. National distribution, which has just begun, is expected to make the tin can fireman as common a sight as a can of brew.

# WESTERN HORMONES

**Sterol Derivatives, Inc.'s new $100,000 plant is first to produce progesterone and testosterone in West.**

NOT LONG AGO steroid products were the province of the Eastern drug houses. Now progesterone and testosterone are being produced in quantities of 4 to 5 kilos per month by Sterol Derivatives, Inc., in a new $100,000 plant at Los Angeles.

S. S. Carlat, president of the company, was formerly sales manager for Nopco Chemical Co. E. Leon Foreman, vice-president, was formerly director of research of Lakeside Laboratories, Milwaukee, Wis.

The new plant, modern in exterior appearance and interior design, is the outgrowth of a smaller pilot-plant operation which has been carried on for the past year in temporary quarters in Alhambra, California. The plant is unique in that it is the only one in the West producing progesterone and testosterone. It also turns out ethinyl-estradiol, mercurophylline, estrone, estradiol and estradiol benzoate.

### Based on Soybeans

Typical of the processing involved, all of which must be carried on in glass or glass-lined vessels, the two main products of the plant are synthesized as follows: Starting with soybean oil foots, the sitosterol is separated from the stigmasterol. Oxidation of sitosterol acetate dibromide is accomplished with chromic acid in 200-gallon glass-lined reactors, yielding dehydroisoandrosterone, which is oxidized to androstenedione. Treating the androstenedione with benzyl alcohols forms the 3-enolbenzyl ether, and by reduction and hydrolysis the male hormone, testosterone, is produced.

Stigmasterol is ozonized as the acetate dibromide to form acetoxybisnorcholenic acid. This is subjected to a Barbier-Wieland degradation with the formation of pregnenolone, and, again by oxidation, progesterone is formed.

One of the unusual pieces of equipment is the Welsbach ozone generator which produces one hundred grams of ozone per hour.

In addition to the main plant, facilities include a research laboratory, boiler house, offices, conference room and the main reaction room containing all heating, cooling and processing equipment.

STEROL DERIVATIVES, INC.: Hormones heed Horace Greeley.

# SETTING THE LIMITS

**Three-year research project indicates that quaternaries, used properly, are relatively harmless.**

QUATERNARY ammonium compounds would enjoy even wider use in the sanitary field than they do, thought Onyx Oil & Chemical Co., if skeptics were convinced of their harmlessness. Would residues of the quaternaries left on dishes or glasses cause liver trouble? or heart trouble? or cancer?

Onyx determined to find out, supported a research project at the Industrial Toxicology Laboratories in Philadelphia, where white rats, guinea pigs, dogs and humans lived with the germicides for over three years. Dr. Herman A. Shelanski has now submitted his report—and his conclusions are a green light for the quaternaries—if used intelligently.

### Large Doses Will Kill

Perhaps an amber light would be a better analogy, for the materials must be used with ordinary caution. An exceptionally large dose will kill, but the quantity necessary is far greater than that likely to be encountered in any conceivable application.

The following quaternary ammonium compounds were used in the study:

1. Alkyl ($C_8H_{17}$ to $C_{18}H_{37}$) dimethyl benzyl ammonium chlorides (Onyx BTC)
2. Alkenyl dimethyl ethyl ammonium bromide[1] (Onyxide)
3. Lauryl isoquinolinium bromide (Isothan Q-15)
4. Alkyl ($C_8H_{17}$ to $C_{18}H_{37}$) dimethyl 3,4-dichlorobenzyl ammonium chlorides[2] (Tetrosan)

In the acute toxicity test, guinea pigs and white rats received (by stomach tube) 10 per cent aqueous solutions of the above compounds, except for Isothan Q-15, which was administered in 20 per cent solution. The minimum lethal dose ranged from 80 mg/kg (for Isothan Q-15 in guinea pigs) to 460 mg/kg (for Tetrosan in rats).

In another test, dogs were given quaternary compounds in their drinking water (in dilution of 1:5,000) for a period of six months. No symptoms of harm were apparent, and autopsies revealed no damage to any of the organs.

By extrapolation of these results, it appears that a 150-pound man could take

[1] The term "alkenyl" is used to indicate a mixture of aliphatic hydrocarbon radicals, principally unsaturated, containing approximately 18 carbon atoms.

[2] Onyx "Tetrosan" grade of alkyl dimethyl 3,4-dichlorobenzyl ammonium chloride also contains alkenyl dimethyl ethyl ammonium bromide, these two products being present in the ratio of 5:1.

in dilute solution without harm about 9 grams of Isothan Q-15, 22 grams of Onyx BTC or Onyxide, or 25 grams of Tetrosan—but it wouldn't be wise to test such an extrapolation!

**Small Amounts Are Safe**

From the practical point of view, toleration of small quantities over long periods of time is far more important than the ability to take a single large dose. Once it could be shown that quaternary residues on food processing equipment or utensils were non-toxic, and that chronic dosage was non-cumulative, then the quaternaries would be more widely used.

Shelanski showed it in a long-term test, where white rats were given the compounds for two years, and guinea pigs for one year. The animals gained weight normally, and it appears that none of the changes evident upon autopsy was attributable to the chemicals. Shelanski's conclusion: "The four quaternary ammonium compounds studied in this investigation may be considered irritants in higher concentrations. In the concentrations tested, these substances are apparently non-toxic to warm-blooded animals." Onyx's study of chronic toxicity is the most thorough to date.

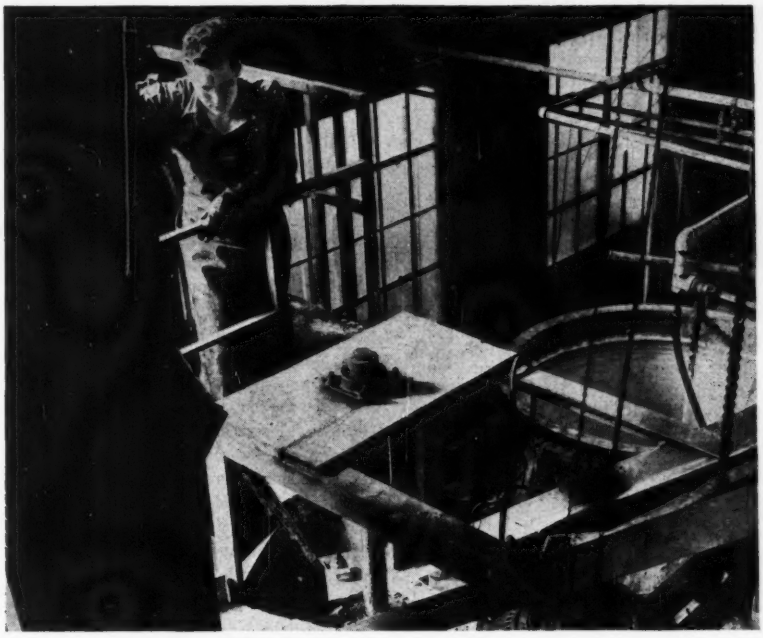
**External Use**

Quaternaries can also be used as local antiseptics in concentrations not irritating to the skin. Shelanski used 250 men and women for patch tests, where cloth discs impregnated with the compounds are held in direct contact with the skin for five days. Solutions of 10 per cent and 1 per cent were irritating, but 0.1 per cent solutions produced no reaction, even after a week—nor was there evidence of any sensitization.

What does all this mean to Onyx? For one thing, sanitation officials will be aware of the limits of safety. The dairy, brewing, bottling, canning and general food processing industries can use these substances with greater confidence. Restaurants, hotels and bars will use them for disinfecting utensils. The housewife may eventually use them along with heat for sterilization of canning jars and utensils. The proved effectiveness of quaternaries in deodorization may open up sizable markets in that direction.

Preliminary chronic toxicity studies undertaken by the Food and Drug Administration's Division of Pharmacology indicate that quantities greater than those Shelanski used are toxic—so it is important that food not be contaminated.

Although generalizations may be made, each quaternary compound is different. Each one, Onyx believes, will have to be judged on its own performance; and Onyx has what it believes to be the most thoroughly-supported figures in its pocket.



BERK'S ZIRCONIUM PLANT: A homesteader cultivates a patch.

# Z FOR ZIRCONIUM

**F. W. Berk & Co. completes large plant for production of zirconium chemicals.**

THINKING of words beginning with Z is usually a tough problem in any parlor game, and the average person is stopped after zinc, zipper, and Zanesville, Ohio. Now F. W. Berk & Co. is joining those who are out to make zirconium a familiar word in the American vocabulary, and to that end it has completed at Woodridge, N. J., one of the largest plants in the country devoted exclusively to the manufacture of zirconium chemicals.

It all started when Malcolm McAllister, executive vice-president in charge of the American affiliate of F. W. Berk & Co., Ltd., of London, got an idea: The company had been importing and selling Australian zircon. Why not process it into commodities of more diversified interest?

**Integrated Operation**

As a result, plans were completed, and construction of a plant was undertaken under the direction of Donald Belcher, Berk's director of research. Upon completion of the plant, Horizons, Inc., was called in as consultant. E. T. Goodridge and Eugene Wainer, of that organization, having had long experience in the zirconium field, were able to contribute materially to the project.

The plant, completed a few months ago, utilizes zircon (zirconium silicate) currently imported from company-controlled properties in Australia. It is processed to zirconium carbonate, acetate, sulfate, nitrate, stearate, and the double salt, sodium zirconium sulfate.

Still in the development stage are zirconium oxide, potassium zirconium fluoride, and various ceramic and refractory materials. The metal itself, various alloys, and other zirconium salts are on the agenda for future action.

The company is also developing zircon deposits in this country, and will thus have a completely integrated domestic operation.

**Three Major Fields**

Zirconium compounds are currently used in three major fields: chemical process industries, ceramics, and metallurgy.

Although many of the chemical uses are too "hot" to be revealed by the company, there is still a huge potential market in the known uses: leather tanning, where zirconium compounds are already firmly established; chemical processing catalysts; formulation of laundry- and dry cleaning-resistant water repellents for textiles; and in the manufacture of various pigments, lakes and toners, where the dye is precipitated by zirconium.

Many zirconium uses are still in the laboratory stage: High-temperature greases, precipitants for synthetic textile fibers, and rubber retardants are a few of these.

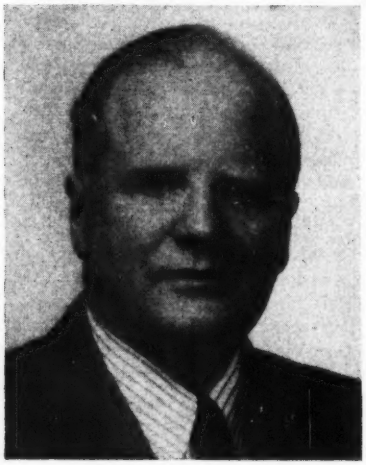
Berk is producing beneficiated zircon for ceramic uses. The silicates and oxides are used in the manufacture of porcelain enamel frits, opacifiers, and high-tempera-

ture refractories. They are also constituents of glazes, of porcelain enamel bodies such as spark plugs and insulators, and of refractory foundry molding sand. Moderate quantities are also used in grinding wheel bonds, electrical insulating cements, and polishes for optical glass.

Metallic zirconium is used in electronic tubes as a "getter" and as a structural element, and in various alloys. A relatively high proportion makes magnesium structurally strong; a lower proportion (0.5 per cent) refines grain size, improves workability. Ferrozirconium, like ferrosilicon, scavenges steel; and zirconium-containing "stainless steels" are super-high-temperature, creep- and corrosion-resistant alloys for gas turbines and analogous applications.

**Room for More**

By no means does Berk have a monopoly in the zirconium field: The Titanium Alloy Division of National Lead Co.,



**DONALD BELCHER: Vocabulary builder.**

Rohm & Haas Co., and Foote Mineral Co. are among the big operators with areas already under cultivation. But zirconium chemistry is new, challenging and —thinks McAllister—going places. There's plenty of room for another homesteader with new ideas.

## CHEMICAL LAURELS

Advisors to the A.S.T.M. Committee on Textile Materials were recently asked their opinions on the "Five Outstanding Developments in Textiles During the Last Decade."

The chemist was responsible for three of them: true synthetics, use of resins, and analytical methods. He also had a part in the other two: strong regenerated-cellulose rayon and mechanical developments (many of which related to dyeing).

# CARE & FEEDING OF NEW PRODUCTS

**Chemical development experts advise caution in launching new products. Better to find shortcomings yourself than have your customers tell you.**

THE CONSTANT evolution of new and improved products is a requirement for success in the fast-moving chemical industry. Yet if wise decisions or proper development steps are lacking in the launching of a new product, it can quickly lose its sponsor's shirt. Like winning football teams, profitable new chemical products today are made, not born.

This was the consensus of representatives of nine major chemical process companies who met as a panel of experts in Chicago last month to discuss techniques and procedures for nurturing new chemicals from the idea stage to full-scale commercial production. The meeting was held under the sponsorship of the Commercial Chemical Development Association.

**Whose Job?**

As to whose job it is to think up new product ideas, the panel agreed that no segment of the company organization should be considered sacrosanct. Product ideas may spring from anybody from the office boy up. As a practical matter, however, most seem to originate from the technical service and sales development groups as a result of outside contacts, with the research department a close second. Few companies risk refusing to listen to ideas that are offered directly from the outside, although these generally are not as valuable as those submitted from within.

One company that is noted for the diversity of its interests permits its research men to spend 15 per cent of their time on work of their own choosing, "no matter how crazy." Most of the subjects selected bear some relationship to company interests, however, and management thus far seems highly pleased with results. Occasionally this system produces a likely-looking product that doesn't logically fit under any of the existing divisions of the company, in which case an independent development budget is set up for that product alone.

Another company has what it calls an "idea book" system. The man with the new product idea is encouraged to write it up as completely as possible and submit it to a screening committee. This company is now working up a punched card record of ideas submitted in order to keep track of who the idea producers are, what happens to the ideas, and to see that credit is given where it is due.

But if new product ideas are the responsibility of everyone, the important job of screening those ideas is clearly centralized.

**Screening the Ideas**

Virtually all of the companies have what is variously known as a new products committee, screening committee, or planning committee. In some companies this committee meets as often as once a week to keep abreast of progress on all projects submitted or under development. More times than not, the committee is responsible directly to top management, without going through an intermediary such as research director or development director. It usually has at least one member each from the research, production, patent and sales departments.

There is some variation among companies as to authority of the screening committee to decide whether a product idea is rejected or goes into active development. In some cases the screening committee has full authority to make this decision, while in others it is reserved for the general manager, with the screening committee acting in an advisory capacity. On one point all of the panel members agree, however: a representative of general management, or whoever is to appropriate the money for the development program and eventually the commercial plant, should be brought into the picture in some manner at this point.

**First Step**

Once a product idea is accepted for further evaluation, should technical research or market research be started first?

This, the experts believe, depends largely on specific circumstances and how much is already known about the product, its uses, market, process and raw materials. In general, if the product is one that is already being made by another producer it goes into market research first. If it is brand new, some technical research on processes and uses is required first. Sometimes, especially if time is a factor, both activities may be carried on simultaneously.

**Timing the Announcement**

How soon should a new product be announced and samples sent to the trade? At this point the experts recommend caution. There is a delicate balance involved in this step of the development program.

Premature distribution of samples may

**PRODUCT DEVELOPMENT EXPERTS:* Making old horses run faster is not their job.**

result in a competitor's picking up a product before the originating company has the advantage of a good head start. Or if production facilities are still confined to the laboratory, the company may find itself unable to supply desired experimental quantities or else be required to tie up an excessive amount of laboratory equipment and personnel in the production of samples. Probably the greatest risk of all is the chance of deficiencies or undesirable properties cropping up in a customer's or prospect's laboratory that might have been avoided by more adequate application research before samples were released. Once a new product gets a black eye, it is frequently extremely difficult to get it accepted even after the deficiency has been remedied.

Counter-balancing these arguments is the fact that delay in announcing a new product, especially if it is one on which competitors might also be working, may result in a competitor's getting there first and reaping the rewards of publicity and use patents. Also, there is advantage to be gained in having as many persons working on the product as possible in the interest of developing broad uses.

Among the panel members, the weight of opinion favored caution in sending out samples while the product is still in the laboratory stage. As a way of getting some of the benefits without the risks of early sample distribution, some companies follow the practice of working closely during the laboratory stage with one or two potential users on an exclusive basis. One company, in fact, makes it a rule that at least one potential customer must be interested in a product before it is taken beyond the laboratory stage. In this connection, emphasis was placed on the importance of supplying laboratory samples with specifications as close as possible to what can probably be produced commercially.

### The Big Decision

Most critical step in the development program is the decision to go from laboratory to pilot-plant. Not only may the pilot stage itself involve expenditures of as much as $50,000 to $250,000, but in most companies, a favorable decision at this point also implies a semi-commitment on eventual commercial-scale production provided the pilot evaluation proves out.

To make such a decision of course requires at least a preliminary market study. This may or may not include a limited distribution of samples. Some companies actually set up small production units, usually made of large laboratory equipment, specifically for the purpose of supplying samples and testing quantities of the material prior to the pilot-plant stage.

In one of the large chemical companies it is the practice to prepare a detailed report at the time the pilot-plant decision is to be made, setting forth all that is known thus far about the product, including size of the market, share that the company can expect to get, and what the product is expected to cost. This is studied from all angles by a planning committee and various specialist departments such as research, development and market research, are called on for additional information if the committee believes it is necessary to the decision. The committee then decides whether the pilot plant appropriation is to be granted, subject or not to top management approval depending on the amount of money involved.

### How Big Is a Pilot Plant?

The experts were divided on the question of what determines the size of a pilot plant.

One group was strongly of the opinion that the primary purpose of a pilot unit is to get process and engineering data for a commercial size plant and that therefore construction should be on the smallest scale that will provide such data.

The other group felt that the pilot plant was frequently useful as a production unit until actual market demand warranted construction of a large plant, and that it should be designed with that in mind. One panel member commented that there had been a noticeable tendency to overbuild pilot plants in recent years because material and equipment shortages frequently delayed construction of commercial plants as much as two years, and the pilot plant was used as a production unit in the meantime.

Both camps agreed, however, that among the principal purposes of the pilot plant were elimination of bugs from the process, establishment of operating procedures, costs and product specifications, and (usually) supplying of material for further product study.

### Distribution of Samples

Most companies distribute samples at the pilot plant stage, but some are more liberal in honoring requests than others. Some restrict samples to selected prospects; others wage an aggressive sample campaign at this point to help get the broadest evaluation possible.

One panel member told of running an advertising campaign on a waste by-product. He received about 500 requests for samples, two of which developed into customers who between them took all of the material. Another member estimated that on the average his company had been able to anticipate only about 25 per cent of the actual uses to which a new product was ultimately put.

All of the experts stressed the importance of following up samples sent to likely prospects, but some conceded that this was not always possible.

There is practically no uniformity in pricing policies on samples and experimental quantities. Some panel members were advocates of the price-it-low-and-get-it-going philosophy, while others favored charging what the traffic would bear. However, it was pointed out that it is seldom possible to sell experimental samples at a price high enough to cover their cost. Most of the companies were in the habit of supplying small samples (one-half to five pounds) free of charge to bona fide prospects except in the case of very expensive materials.

Where the experimental quantity price

* l. to r.: J. M. Gillet, Victor Chemical Works; C. M. Walton, Minnesota Mining and Manufacturing Co.; Francis J. Curtis, Monsanto Chemical Co.; D. K. Ballman, The Dow Chemical Co.; J. B. Calkin, consultant; H. M. Corley, Armour & Co.; A. L. Elder, Corn Products Refining Co.; L. B. Hitchcock, Quaker Oats Co. Not in picture: W. B. Plummer, Indoil Chemical Co.; J. J. Schaefer.

is higher than the anticipated commercial price, it is considered good policy to give an indication of what the final commercial price is expected to be without actually quoting a price.

**Commercial Plant Decision**

Finally, as the last step in the product development program, there is the decision to build or not to build a full-scale plant. This decision depends on the success of the pilot plant and definite assurance of a market. It is generally made either by top management or the board of directors, depending on the amount of capital required. Size of the plant is usually determined by the expected market as indicated by market research studies. The market research department is on trial at this point, for it is just as serious to build a plant too small as one too large.

With the approval of the commercial-scale plant and determination of its size, the product development job is completed. Development of new uses and expanded sales beyond this point is up to the general sales and technical service departments. As one panel member put it, "It isn't the job of new product development or sales development to make old horses run faster."

# PETROSULFUR

**Petroleum sources promise five hundred tons of sulfur per day by 1951.**

A NEW SOURCE of elemental sulfur is in the making. Four plants for the recovery of sulfur from the hydrogen sulfide in petroleum hydrocarbon fractions, construction of which has been recently scheduled, will, together with the one now in operation, produce about five hundred tons of elemental sulfur (1500 tons of sulfuric acid) per day.

This is about four per cent of the present elemental sulfur production from the salt domes of Louisiana and Texas. The four plants include two for sulfur recovery from refinery gas streams and two from natural gas.

**From Refinery Gases**

A plant to produce sulfur from refinery gases, to be built by Hancock Chemical Co., a subsidiary of the Hancock Oil Co., will be located in the Los Angeles area and will draw the feed gases from adjacent refineries. A second is being constructed by Freeport Sulphur Co. to recover sulfur from the hydrogen sulfide gas stream produced by Texas Co.'s new refinery at Eagle Point, N. J. (Texas' new refinery is expected to be completed some time next summer.)

Freeport's new plant will utilize a modification of the Claus process for the recovery of sulfur from hydrogen sulfide: The latter is recovered in a Girbotol-type unit. Elemental sulfur is then formed by passing hydrogen sulfide over a bed of bauxite which catalyzes the formation of sulfur by combustion of hydrogen sulfide in a limited supply of air. Sulfur is removed by condensation from the effluent gases leaving the catalyst chamber.

In the Girbotol process, developed by the Girdler Corp. for the recovery of acid gases, an ethanolamine solution absorbs acidic hydrogen sulfide in one tower. The sulfide is stripped from the amine solution by heat in a second tower. Oxidation of the resultant hydrogen sulfide-containing gas with sulfur dioxide (which can be formed by burning part of the hydrogen sulfide) completes the cycle to elemental sulfur.

**From Natural Gas**

Southern Acid and Sulphur Co. benefited from the first commercial recovery of sulfur from a petroleum hydrocarbon source—the extremely sour gases of the McKamie and Dorcheat fields in Arkansas. These units, installed in the mid-'40s, utilize the Girbotol process.

The two recently scheduled plants for recovery of sulfur from natural gas will be located in Wyoming to take advantage of the sulfur-rich natural gas in that area. One is to be erected by the Stanolind Oil and Gas Co., while the other will be built by the Texas Gulf Sulphur Co. to purify natural gas for the Pure Oil Co.

Stanolind's plant is expected to be operating by April, 1949, and will provide gas to repressure the Elk Basin Oil field, the largest producing field in the state. In contrast to most fields, Elk Basin does not produce sufficient natural gas for repressuring. The hydrogen sulfide extracted from the gas (20% $H_2S$) will provide about seventy tons of sulfur per day. Sufficient gas for repressuring will be provided by burning the sulfur-free gas with air. The much larger volume of the combustion products will provide proportionally greater effectiveness in repressuring.

Construction of Texas Gulf's plant at Worland, Wyoming, is expected to start in the early spring. It will extract hydrogen sulfide from natural gas carrying over 20 per cent hydrogen sulfide, utilizing the Girbotol process.

# STERILE "STICKWATER"

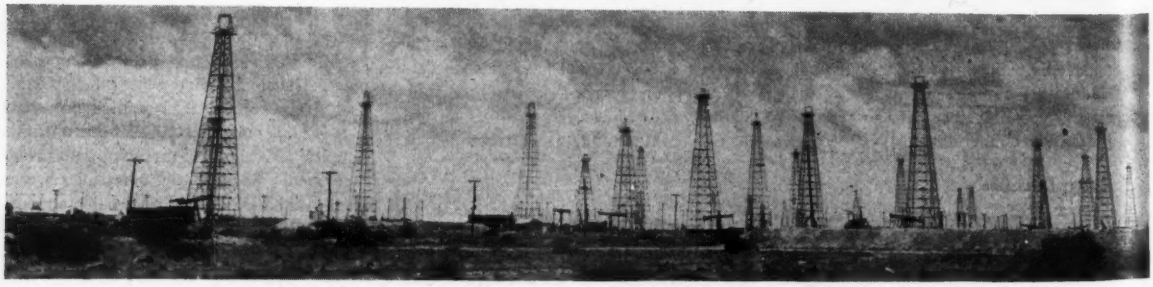
**Only the water in "stickwater" is now dumped, the noxious portion emerging as food.**

CENTRIFUGAL separators, sulfuric acid and ingenuity have been combined to rid the fish industry of noxious "stickwater" from its processing plants. Stickwater is the waste remaining after the non-food portions of fish have been processed to meal and fertilizer.

The solution of this problem is the culmination of years of investigation of proteins and amino acids by Sven Lassen, of the Van Camp Sea Food Co. Seven units are now operating and Sharples Corp., licensing agent for the process, states that several more are in various stages of construction, ranging from negotiation to near completion.

**Adjust pH**

First step in the process is to adjust the pH of the stickwater by adding sulfuric acid. This coagulates the colloidal protein and precipitates some of the protein-splitting enzymes, thus stabilizing the solution against decomposition. The product, which is a meal, is high in protein and an "unknown growth factor," is a more desirable food source than ordinary



OIL WELLS: Not only the entire gamut of organic petrochemicals, but now petrosulfur, too.

SVEN LASSEN: Only water is dumped.

fish meal. It is separated from the solution by a horizontal continuous centrifugal filter.

Recovery of the fish oil content requires use of another type of centrifuge which can continuously discharge both solids and liquids, such as the Sharples Nozljector.

**Evaporate**

The liquid remaining from previous steps is then concentrated by evaporation under vacuum to produce "condensed fish solubles," usually marketed on a 50-per cent-solid basis. This product contains biologically active constituents as well as a fair concentration of protein. It is also a source of minerals, vitamins and amino acids, valuable for feeding poultry and cattle. Only evaporator condensate is dumped.

# THREE-IN-ONE

**New synthetic detergent, reduces pickling acid requirements, eliminates spray and inhibits metal corrosion by pickle acid.**

A TOTALLY new material will shoulder into the synthetic detergent market when the new Nytron plant of Solvay Process Co., division of Allied Chemical & Dye Corp., comes into operation. Company officials guardedly comment that they hope to have the plant located at Hopewell, Va., in full operation in the near future. Present plans call for confining sales efforts to the industrial field.

**What Is It?**

Nytron cannot be placed into any of the classifications of synthetic detergents as they are now known. It is produced by treating a high molecular weight petroleum-derived olefin with nitrosyl chloride (*CI, March '48, p. 384*) and reacting the product with sodium bisulfite.

In its final form Nytron is a light, straw-colored solid with about 35% active ingredient. It is an anion-active material whose polar groups consist primarily of sulfonates. It is non-toxic and a good foaming agent, particularly when used in hard water.

**Three-In-One**

Nytron is claimed to have greater tolerance for inorganic salt solutions than other acid-stable detergent types (alkyl aryl sulfonates, polyether alcohols and hydrocarbon sulfonates). These properties suggest its use in pickling and nickel plating baths to clean the surfaces of the metal being pickled or plated.

Plant-scale trials in at least eight different steel mills have proved Nytron's utility. Further, two more desirable effects were observed. Nytron acts as a corrosion inhibitor and forms a foam on the surface of the pickling bath that completely eliminates the fume problem so prevalent in pickle houses. Pickling time is also reduced 20-50%.

The inhibition of corrosion and Nytron's utility in the presence of high ferrous sulfate concentrations conserve pickle acid as much as 50%. Some pickle houses discard pickle liquor when the concentration of ferrous sulfate reaches 8-10%. Use of 0.1% Nytron in the pickle bath permits ferrous sulfate concentration to go to 16% with equivalent cleaning of the metal surface. This means less sulfuric acid, less metal loss in pickling, and a great reduction in the amount of waste pickle liquor to be got rid of.

Finally, pickling baths often deposit a hard impervious scale in the tanks. Previously its removal was a pick-and-shovel operation. Nytron permits a simple hosing operation for tank cleaning.

**Agricultural Sprays**

Nytron's greater resistance to hard water makes it a good wetting and dispersing agent for agricultural sprays such as sulfur, DDT, or 2,4-D. Clogging of spray nozzles is completely avoided.

U. S. Sugar Co. operates a 30,000-acre sugar cane plantation at Clewiston, Fla., and uses a formula containing equal portions of Nytron and the sodium salt of 2,4-D. According to Dr. B. A. Bourne, Director of Research for U. S. Sugar, the presence of Nytron has been found so critical that 2,4-D sprays without it were ineffective against several major weeds. Although a commercial neophyte, Nytron has already forwarded the solution of two difficult problems. A low unit cost and good detergent properties promise a bright future.

# SWEET AND UNSPOILED

**Chemical treatment prevents deterioration of cottonseed under storage.**

ONE CATCH in the "ever-normal granary" concept for achieving agricultural stability is that "moth and rust doth corrupt, and thieves break in and steal." New rat poisons such as Antu and "1080" are reducing thievery, and new chemical treatments now under test may lessen corruption.

Chemical treatment to keep cottonseed from spoiling in storage is under test by Aaron M. Altschul, biochemist at the U. S. Department of Agriculture's Southern Regional Research Laboratory at New Orleans, as a result of which it may soon become common practice to check such deterioration by chemical means.

Altschul and his co-workers aren't yet

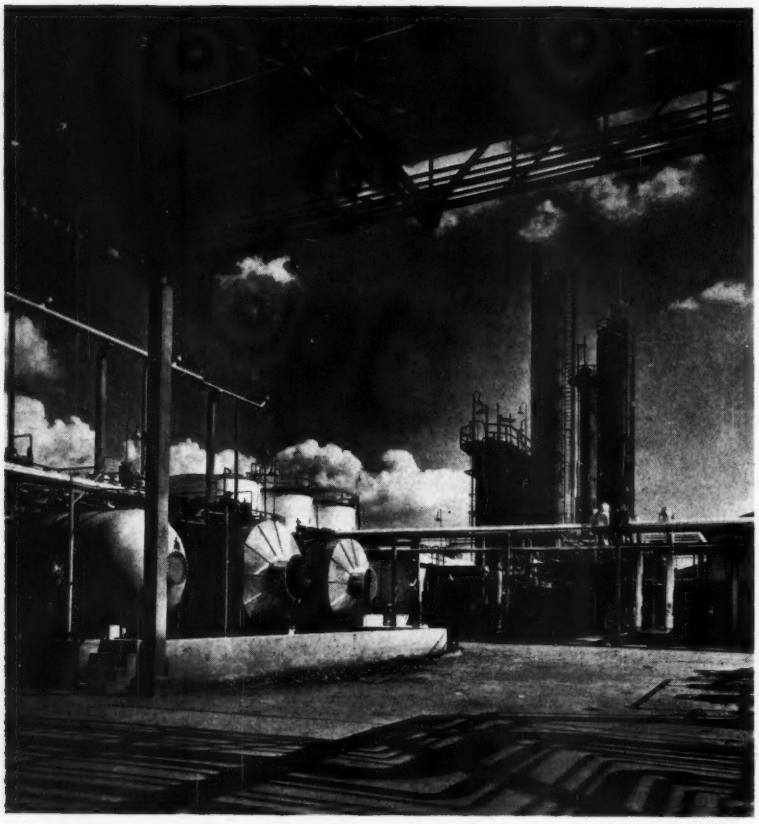
A. M. ALTSCHUL: Chemicals conquer corruption.

ready to recommend specific chemicals or the methods of such treatment in commercial operations. But already tested are some 300 chemicals, with 200 others yet to be tried out. So far, about 45 of these compounds, when used in low concentrations, have been found to reduce the amount of decay-caused heating in the seeds.

A mixture of propylene glycol dipropionate and bischloromethyl xylene was said to give "highly satisfactory results" in mill-storage tests. Seeds were sprayed with this liquid mixture as they moved by conveyor to storage bins. Only 10 pounds (about a gallon) of this mixture was used for each ton of seed. The mixture, by preliminary tests, is relatively non-toxic; and feeding experiments on meals made from treated seeds show no ill effects.

# ETHANOL:

by HERMAN W. ZABEL
Associate Editor
Chemical Industries



Shell Chemical produces ethanol by catalytic hydration of ethylene at Deer Park, Texas.

**SEVENTY PERCENT of ethanol capacity, now approaching peak of million gallons a year, is based on ethylene. New sources for acetaldehyde threaten this very sizable market.**

WITH ethylene now the source of seventy per cent of all industrial alcohol, a new set of factors must be considered in analyzing the postwar ethanol market. As is generally the case in a shift from one raw material to another, new economic complexities are no more easily resolved than the old, and the old often refuse to be summarily banished from the scene. The latter is particularly true in this case, since fermentation of blackstrap molasses is still a very live, and at times, mulish competitor.

Consideration of carbohydrate raw materials for alcohol has given way to examination of sources and processes for production and recovery of ethylene (*CI, Aug., '47, p. 205*). In 1950, however, there may be another factor to complicate the picture — by-product ethanol from Carthage Hydrocol, Inc.'s Brownsville, Texas, plant for hydrocarbon fuels from natural gas.

A change in sources of acetaldehyde may further materially affect the ethanol market. During 1948, approximately 40 per cent of total ethanol went into production of acetaldehyde and other aldehydes. Acetaldehyde now is being produced on an extremely large scale by direct oxidation of hydrocarbon gases by Celanese Corp. at Bishop, Texas, and the McCarthy Chemical Co. at Winnie, Texas. In addition, hydration of acetylene produced from natural gas by the Tennessee Eastman Corp. (*see p. 178*) could mean large volumes of "non-alcoholic" acetaldehyde.

## FROM ETHYLENE

Completion of Shell Chemical Corp.'s new plant at Deer Park, Texas, and the addition to Carbide and Carbon Chemical Corp.'s plant at Texas City, Texas, will establish the structure of the ethanol-from-ethylene industry for some time to come. The latter part of 1948 saw a 150 per cent production increase by Carbide at Texas City, now producing at an annual rate of about 36 million gallons* a year. Shell's new unit at nearby Deer Park has an announced design capacity of 18 million gallons a year. Its second month of operation—November—saw production at an annual rate of 15 million gallons, indicating the possibility of full capacity production by now.

Thus well over 50 million gallons of ethanol, nearly half of the total production from ethylene, will come from the Houston area in 1949.*

With the exception of Esso Standard Oil Co.'s capacity at Baton Rouge, La., the remaining ethanol from ethylene is produced in Carbide's plants at South Charleston, W. Va., and Whiting, Ind. The South Charleston unit, first of its kind, started operation in 1930. Annual production there is now about 25 million gallons, while that at the Whiting plant, which began in 1935, is about 12.5 million gallons.

All ethanol from ethylene, other than that produced by Shell comes via absorption of ethylene in sulfuric acid and hydrolysis of the resultant ethyl sulfate. Shell uses direct catalytic hydration.

Producers have released very little information on the cost of making ethanol from ethylene. One can get a fair idea of pre-inflation costs, nevertheless, for it is known that very appreciable quantities moved at 18 cents per gallon in the early days of the war. However, to arrive at a normal sales price, some figure must be added for the cost of making sales, usually somewhat over 10 per cent in the chemical industry. Thus a more true market price would have been about 20 cents per gallon, and this represents an absolute minimum.

Since that time there has been inflation

*In this article the term "gallon" refers to a wine gallon. A wine gallon is one gallon of 95 per cent ethanol.

**U.S. NON-CARBOHYDRATE ETHANOL PLANTS**

| Company | Location | Estimated capacity Gals. 95% Ethanol per year |
|---|---|---|
| Carbide & Carbon Chemicals Corp. | Whiting, Ind. | 12,500,000 |
| Carbide & Carbon Chemicals Corp. | Texas City, Texas | 36,000,000 |
| Carbide & Carbon Chemicals Corp. | S. Charleston, W. Va. | 25,000,000 |
| E. I. du Pont de Nemours & Co. | Belle, W. Va. | 600,000 |
| Esso-Standard Oil Co. | Baton Rogue, La. | 19,000,000 |
| Shell Chemical Co. | Deer Park, Texas | 18,000,000 |
| Total | | 111,000,000 |

# Synthetic Processes Outrun Fermentation

in all costs—construction, hydrocarbon raw material, labor, overhead, and sales. These increases have not yet been fully evaluated, but the minimum increase in the cost of the hydrocarbon raw material for the new facilities is probably 5 cents per gallon. This makes it questionable that ethanol from prewar facilities can be sold at a reasonable profit for less than 25-28 cents a gallon and from postwar facilities for less than 30-32 cents a gallon. A reduction in hydrocarbon prices can well revise these figures downward, but this will not occur for some time as the long-term contracts under which the companies operate tend to iron out short-term fluctuations.

Nothing is known of Shell's costs, but capital investment is believed to be of the same order of magnitude as that for an ethyl sulfate plant. With the exception of the sulfuric acid used per cycle, not required by Shell, raw materials cost should not be too far different from that of an ethyl sulfate unit.

### ACETALDEHYDE A FACTOR

Production of acetaldehyde by the direct oxidation of petroleum hydrocarbons poses a distinct threat to a very sizable portion of the ethanol market. In fact, a few have hazarded the opinion that ethanol might eventually be made by the hydrogenation of acetaldehyde. However, hydrogen, even when made from cheap natural gas, is still too expensive to make that possibility of immediate concern.

Small quantities of acetaldehyde were being produced by hydrocarbon oxidation even before ethanol was made from ethylene. This was at the Cities Service hydrocarbon oxidation unit at Tallant, Okla., which was built in the late twenties.

Real progress in this direction, however, came with the multi-million dollar plant of Celanese Corp., completed at Bishop, Texas, in 1945. Here acetaldehyde is the principal product of air oxidation of butane and propane. McCarthy Chemical Co., which recently completed its Winnie, Texas, plant, uses 95 per cent oxygen instead of air as the oxidizing agent and ethane as the hydrocarbon.

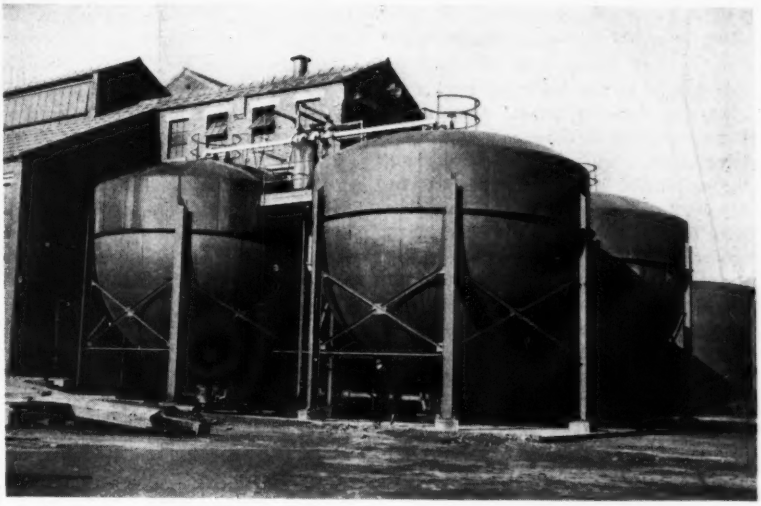
Acetaldehyde from acetylene is an old story, but commercial production of acetylene by the thermal cracking of natural gas is new. Many have indulged in planning, but the huge investment required and many difficult technical problems so far have deterred actual plant construction. With Tennessee Eastman Corp. now understood to be combing the Southwest area for plant sites for such an operation, a new source of acetylene and acetaldehyde may be in the offing.

### FROM CARBOHYDRATES

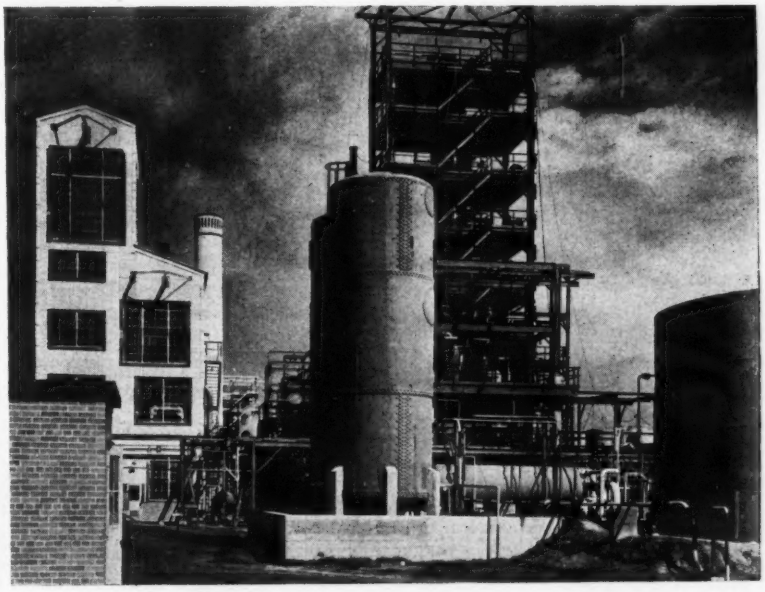
The yeast organism is very adaptable. Fermentation of local raw materials in all parts of the world produces a water solution of ethanol from which the alcohol can be recovered by distillation.

In the United States the low cost and ready availability of blackstrap molasses, which the sugar refiners must dispose of, had enabled it to pre-empt the market until this year. Grains, from which such a large percentage of our wartime alcohol requirements were produced, are not economically attractive as fermentation raw materials. Certainly greater cost consciousness and freer supply of alcohol from less costly raw materials in recent months has greatly reduced their use.

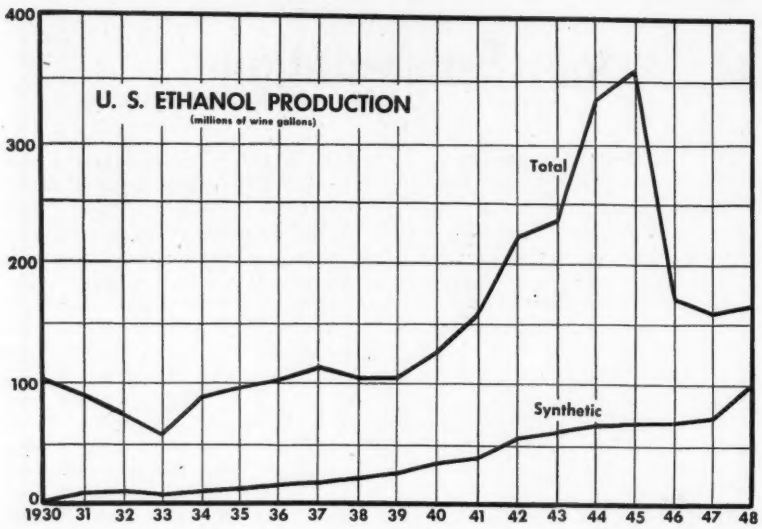
Production from blackstrap molasses is another matter. This "stinking" residue from sugar refining operations must be disposed of in some manner if it is not sold as animal feed or as an alcohol raw material. Some is produced in Louisiana but most is imported, principally from Cuba. However, Cuba requires 25 per cent alcohol in its motor fuel, and this is prepared from molasses. Release of



75,000 gallon fermentaters of New England Alcohol Co., Everett, Mass.



Synthetic ethanol from ethyl sulfate at Esso-Standard's plant at Baton Rouge, La.




*Data: Nelson,* Oil and Gas Journal, *Jan. 6, 1948, p. 90*

this supply to the industrial market is always a dormant threat. Conversely, large-scale adoption of ion exchange treatment of sugar cane molasses will reduce the amount of blackstrap produced. In any event, the amount of alcohol available from blackstrap is limited by cane sugar production and at present there is little, if any, unutilized blackstrap. Any major ethanol capacity increase will have to come from other sources. The recent reduction in the price of blackstrap is only a return to a normal pricing system for the ethanol industry.

It's a moot question in most quarters whether sulfite waste liquor is an attractive raw material for fermentation to ethanol. Huge volumes of liquor must be handled in the plant (nearly one hundred gallons of liquor are required to produce one gallon of ethanol) and, as yet, only about 2.7 million gallons of ethanol—slightly over one per cent of the total U. S. production—comes from this source.

Despite this disadvantage, sulfite pulp mills may find ethanol production from sulfite waste liquor an economical means of disposing of this troublesome material as stream pollution laws become more stringent.

Any major expansion of ethanol production via fermentation is highly improbable with the possible exception of a moderate expansion of sulfite liquor fermentation, and that primarily due to anti-pollution laws and not dollars-and-cents economics.

## FROM SYNTHESIS GAS

Prior to cancellation of the projected synthetic liquid fuels plant of the Stanolind Oil and Gas Co. at Garden City, Kansas, ethanol production from carbon monoxide-hydrogen mixtures was a sizable cloud on the horizon. Cancellation of this unit and the easing in crude oil supply has tended to calm the ethanol industry's fears.

Ethanol from this source is a by-product of the reaction of synthesis gas (carbon monoxide and hydrogen from partial oxidation of methane). It is expected that about five million gallons per year will be made available when the one remaining scheduled plant, that of Carthage Hydrocol, Inc., at Brownsville, Texas, starts operation in 1950.

In itself, five million gallons is insufficient to cause much concern, but it is a by-product material whose production is independent of alcohol demands. Such a condition is often conducive to price cutting if disposal becomes difficult. Further, there was the threat—now somewhat abated—of several plants being erected. Twenty to thirty million gallons per year would be another matter.

A small quantity of ethanol, about 600,000 gallons per year, has been produced as a by-product of the reaction of carbon monoxide and hydrogen by E. I. du Pont de Nemours and Co. at Belle, W. Va., for a number of years. This is fractionated from the higher alcohols obtained in the methanol synthesis.

## SUMMARY

In spite of a large increase in the cost of ethylene over the past two years, it appears that it is the raw material of choice for any expansion in ethanol production. Stream pollution laws may force larger production from waste sulfite liquor despite the apparent higher cost of production. Demand is approaching a peak as non-alcoholic processes for acetaldehyde production threaten that huge market for ethanol. Further, substitution of methanol for ethanol in non-permanent type anti-freezes promises to continue apace (*CI, May '48, p. 764*).

## END USES OF SPECIALLY DENATURED ALCOHOL

*Fiscal Year Ended June 30, 1948*

| *Product or use* | *Net quantity of alcohol used (M wine gals.)* |
|---|---|
| A. SOLVENT: | |
| 1. *Cellulose, resin and related products* | 9,042 |
| Lacquers, varnishes, and enamels | 3,897 |
| Cellulose | 612 |
| Synthetic resin (with or without natural resins but containing no cellulose compounds) | 531 |
| Shellac (containing no cellulose or synthetic resins) | 2,083 |
| Other natural resins (containing no cellulose, synthetic resin or shellac) | 329 |
| Other coatings | 122 |
| Plastics | 3,764 |
| Cellulose compounds | 469 |
| All other plastics (containing no cellulose) | 3,295 |
| Photographic film (including emulsions) | 817 |
| Transparent sheeting | 80 |
| Cellulose intermediates | 90 |
| Explosives | 90 |
| Polishes | 31 |
| Adhesives | 75 |
| Soldering flux | 99 |
| Inks, stains, and dye solutions (containing no cellulose or resins) | 99 |
| 2. *Solvents and thinners for cellulose, shellac, resin products, etc.* | 18,312 |
| Proprietary solvents | 18,077 |
| Other industrial thinners | 235 |
| 3. *Toilet preparations* | 5,119 |
| 4. *Processing industrial, food, drug, and other products* | 9,863 |
| Nitrocellulose (dehydration) | 3,972 |
| Sodium hydrosulphite | 374 |
| Wood rosin and synthetic resins | 1,286 |
| Petroleum oils | 710 |
| Pectin | 27 |
| Food products other than pectin | 9 |
| Drug products | 2,185 |
| Dyes and intermediates | 633 |
| Perfume materials and fixatives | 34 |
| Photographic developers | 62 |
| Miscellaneous chemicals | 394 |
| Miscellaneous | 176 |
| 5. *Pharmaceutical products for external use* | 2,943 |
| 6. *Cleaning, preserving, and flavoring preparations* | 1,426 |
| Tobacco sprays and flavors | 730 |
| Cleaning preparations (including cleaning operations) | 165 |
| Deodorant Sprays (non-body) | 51 |
| Disinfectants, insecticides, etc. | 40 |
| Sterilizing and preserving solutions | 41 |
| Embalming fluids and related products | 26 |
| Industrial soaps | 41 |
| Photoengraving and rotogravure use | 68 |
| Miscellaneous | 264 |
| B. RAW MATERIAL IN PRODUCTION OF OTHER CHEMICALS | 102,013 |
| Vinegar | 3,645 |
| Acetic acid | 679 |
| Ethyl acetate | 5,833 |
| Ethyl chloride | 8,221 |
| Other ethyl esters | 2,581 |
| Dyes and intermediates | 347 |
| Aldehydes | 72,935 |
| Ether, ethyl | 871 |
| Ethers, glycol and other | 2,246 |
| Ethylene dibromide | 1,104 |
| Xanthates | 544 |
| Fulminate of mercury | 60 |
| Ethylene gas | 53 |
| Synthetic rubber | 371 |
| Rubber accelerators | 77 |
| Miscellaneous | 2,446 |
| C. AS A FLUID | 317 |
| Anti-freeze | 5 |
| Brake fluids | 4 |
| Cutting oils | 26 |
| Other fluid uses (including door checks) | 282 |
| D. AS A FUEL | 404 |
| Motor fuel | 1 |
| Airplane fuel | 163 |
| Other fuel uses | 240 |
| E. FOR LABORATORY AND EXPERIMENTAL PURPOSES | 473 |
| GRAND TOTAL | 149,906 |
| F. SPECIALLY DENATURED RUM USED: Tobacco sprays and flavors | 1,068 |

*Source: Alcohol Tax Unit, Bureau of Internal Revenue.*

# DISINFECTANTS and SANITIZERS

## Better Products for a Bigger Market

by P. G BARTLETT
West Disinfecting Co., Long Island City, N. Y.

**NEW SYNTHETICS join coal-tars, pine oils and hypochlorites in serving expanding market for sanitation. Detergent-sanitizers are typical of the improved products now being marketed, but better evaluation methods would accelerate developments in this growing industry.**

THE DISINFECTANT industry is one of the most heterogeneous in the chemical specialties field. It ranges from one-man organizations mixing coal-tar distillates in small tanks to large corporations with research staffs developing new chemicals to kill bacteria.

Greatest volume of disinfectants, however, is manufactured by producers of "sanitary" supplies, a category that includes liquid soaps, floor finishes, insecticides and equipment for their application in addition to disinfectants. Some specialize in bulk manufacture and shipment for industrial use, whereas a number manufactures household items exclusively, either for direct door-to-door sale or for distribution through grocery, drug and hardware stores.

Because of the mixed character of the industry, there are no satisfactory statistics available on the dollar value or tonnage volume of its product. The U. S. Bureau of Census reported that in 1939 about 1,500 concerns were engaged in manufacture and distribution of sanitary supplies, and estimated the total value of these products at over $100 million a year. Since that time, increased awareness of the need for sanitation to protect public health, and wide use of more efficient chemicals—especially quaternary ammonium compounds and synthetic phenolics—have greatly expanded the market.

### CONFUSION OF TERMS

The many fields of application of antibacterial products have been responsible for the misuse of a half dozen fairly familiar terms. In the dairy field and in other food processing industries, products intended to destroy micro-organisms are often referred to as "sterilizers." This is not correct since sterilization means complete destruction of all living micro-organisms including bacterial and fungal spores. There are no commercial chemical products on the market that can be depended upon to be so efficient. Fortunately, it is seldom necessary to effect complete sterilization to provide adequate safety to public health or to maintain equipment in condition to process good quality food products.

Sometimes the word "antiseptic" is misused also. An antiseptic is a drug primarily intended for application to humans or animals and not for the treatment of inanimate objects. Although there are exceptions, antiseptics are outside the scope of a description of disinfectants and sanitizers.

Disinfecting is a word that has appeared in literature since early in the 17th century, yet there is still frequent debate regarding its precise meaning. It is generally agreed that disinfectants are primarily for use on inanimate objects, and should be effective in destroying vegetative cells, including pathogens, but not resistant spores. Most infectious bacteria and most micro-organisms that cause trouble in food processing are not spore formers.

Effectiveness of a disinfectant is determined by the phenol coefficient test as described in the U. S. D. A. Bulletin #198. On the basis of this test, which will be discussed later, a disinfectant should actually destroy and not simply inhibit the growth of the test organism. The general public usually associates the word "disinfectant" with a product having a strong pungent odor, and used in sick rooms, hospitals and toilets. There is no justification for such limitations today, but it takes time to change such popular impressions.

It has only been in the last six or eight years that the term "sanitizer" has come into common use. There was a distinct need for a term to describe products intended primarily for use on food processing equipment and for treating dishes and glassware in public eating and drinking establishments. To call such products "disinfectants" was unsatisfactory because of the association of the term with coal-tar or pine oil type compounds.

More important than this, there are usually different classes of basic materials, different types of manufacturers, and most important of all, somewhat different federal regulations concerning the use of disinfectants for hospitals, and sanitizers for dairies, bakeries, breweries, etc. There is some overlapping, of course, such as the use of hypochlorites in hospitals and the possibilities of some of the newest synthetic phenolics in the field of food plant sanitation, but in general the separation into two separate categories seems justified.

Germicides and bactericides are prac-

Odorless quaternaries win favor in restaurant and bar sanitation.

tically synonymous and refer to any chemical capable of destroying bacteria. A germicide may be a disinfectant, an antiseptic, or a sanitizer depending on the uses recommended on the label.

## DISINFECTANTS

### COAL-TAR DISTILLATES

The oldest and perhaps most popular disinfectants for use in hospitals, schools, public institutions and for general building sanitation are made from coal-tar distillates. They may contain anywhere from 15% to 60% of the so-called tar acid oils which are mixed fractions in the distillation range of 200° to 250° centigrade (mixed xylols and cresols, low in phenol). These materials are supplied to the industry by producers of coal-tar chemicals, including most of the major steel companies.

Such products are insoluble in water and are solubilized by blending with liquid soap solution. Upon further dilution with water, a milky emulsion is formed. These products are generally somewhat more effective against Gram-negative bacteria than against Gram-positive organisms. Coal-tar disinfectants are necessarily restricted in their use to applications where they will not come in contact with food because of toxicity and strong odor. They have good penetrative properties and hold up well in the presence of contamination.

Cresylic disinfectants are essentially a special class of coal-tar disinfectants containing coal-tar derivatives high in cresol. They, too, are prepared in soap solution but do not emulsify when diluted in water because of the higher water solubility of the cresols.

Cresylic and coal-tar disinfectants find widest application in shower baths, locker rooms, stables, kennels, and chicken coops and for scrubbing floors and walls. They are also used as cattle dips since they have some insecticidal value as well as disinfecting properties and help to eradicate flea, lice and tick infestations.

Coal-tar disinfectants are also added to cutting oils to increase the life of the cutting oil and to reduce infection in cuts and scratches among the operators of machine tools.

Disinfectant manufacturers may supply coal-tar products in drums to the industrial consumer or may deal through janitor supply companies. The same products are also supplied in pint bottles or less through retail outlets for household use. Several larger manufacturers in the midwest conduct their own door-to-door sales. This distribution pattern is also true for pine oil disinfectants since manufacturers usually handle both types.

### PINE OIL

In the last decade or so, pine oil disinfectants have become increasingly popular especially throughout the South where pine oil is produced by the naval stores industry. A majority of users seem to prefer the pine odor to that of coal-tar. Typical disinfectants contain at least 60% pine oil, about 30% soap, and not over 10% water. A good pine oil disinfectant will retain a clear reddish amber color under normal conditions of storage, and will form a stable emulsion in water when diluted about one to twenty.

Uses for pine oil products are similar to those of the coal-tars, but are somewhat more restricted because they are quite ineffective against Gram-positive bacteria such as the common ones that cause eye, ear, nose or throat infections. Federal regulations do not permit label recommendations for application in hospitals where there is danger of infection from Gram-positive pathogenic bacteria. Here is an instance of a product generally classified as a disinfectant which does not coincide with the generally accepted definition of a disinfectant.

### ODORLESS TYPES

Newer and better pine type disinfectants are now being prepared by using less pine oil and fortifying with synthetic phenolic compounds such as the chlorinated phenols (The Dow Chemical Co.'s Dowcides), chlorinated phenyl phenols (Monsanto Chemical Co.'s Santophens), or alkylated phenols available from many sources. Essentially, these are much better products since they can be formulated to be effective against both Gram-negative and Gram-positive organisms, and they have a less pungent odor. As a matter of fact, the pine oil can be eliminated entirely and odorless disinfectants of greater efficiency can be prepared.

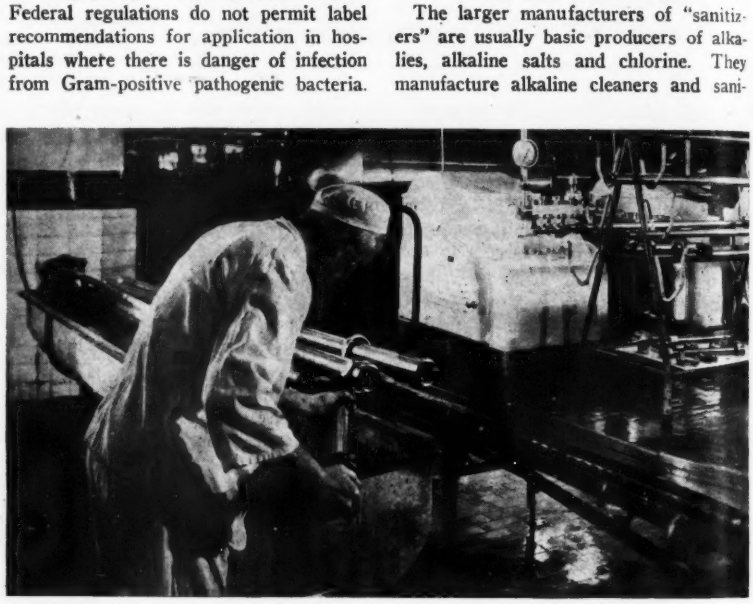
But as yet, odorless disinfectants have not been very popular either in the industrial or in the household field. Since the user cannot see bacteria die, he wants a product with a distinctive property he customarily associates with anti-bacterial action.

Quaternary ammonium compounds, too, may be used for the preparation of odorless disinfectants, but these have not become popular either, primarily because of absence of odor. Pine oil and coal-tar cannot be satisfactorily incorporated into quaternary ammonium solutions since the quaternaries are incompatible with the soap required to solubilize the coal-tar or pine oil.

## SANITIZERS

### CHLORINE LIBERATORS

The larger manufacturers of "sanitizers" are usually basic producers of alkalies, alkaline salts and chlorine. They manufacture alkaline cleaners and sanitizers for restaurant and bar sanitation and for cleaning and sanitizing dairy farm equipment as well as equipment in dairy processing plants. Similar products are usually applicable in other food processing industries as well.



Detergent-sanitizers clean and sanitize milk processing equipment in one operation

The most widely used sanitizers are the hypochlorites which are generally powdered mixtures of sodium and calcium hypochlorite. In some products the hypochlorite may also contain trisodium phosphate or a polyphosphate.

Other important chlorine liberating sanitizers are prepared from the chloramines (Wyandotte Chemical Corp.'s Sterichol), succinchlorimid (made by National Aniline Division, Allied Chemical & Dye Corp.) or diazo chlorimid (produced by Wallace & Tiernan Co., Inc.), and chlorinated trisodium phosphate sold by the Diversey Corp. under the trade name of Diversol.

The hypochlorites and organic chlorine-liberating compounds are usually supplied in powdered form in containers ranging from one-pound packages or bottles to

## QUATERNARY AMMONIUM COMPOUNDS USED FOR PREPARING SANITIZERS

| *Chemical Compound* | *Trade Name* | *Manufacturer* |
|---|---|---|
| Alkenyl dimethyl ethyl ammonium bromide | Onyxide | Onyx Oil and Chemical Co. |
| Alkyl ($C_{16}$-$C_{18}$) benzyl hydroxy ethyl imidazolinium chloride | Alrosept MB | Alrose Chemical Co. |
| Alkyl ($C_8$-$C_{18}$) dimethyl benzyl ammonium chloride | Roccal | Winthrop-Stearns, Inc. |
| | BTC | Onyx Oil and Chemical Co. |
| | Rodalon | Rhodes Chemical Corp. |
| Alkyl ($C_8$-$C_{18}$) dimethyl 3,4-dichloro benzyl ammonium chloride | Germ-I-Tol | Fine Organics, Inc. |
| | Tetrosan | Onyx Oil and Chemical Co. |
| | Dichloran | Fine Organics, Inc. |
| Alkyl ($C_8$-$C_{18}$) trimethyl ammonium chloride | Arquad C | Armour & Co. |
| Alkyl naphthylmethyl pyridinium chloride | Emcol 888 | Emulsol Corp. |
| Cetyl dimethyl benzyl ammonium chloride | Cetol | Fine Organics, Inc. |
| | Cetylon | Rhodes Chemical Corp. |
| Cetyl dimethyl ethyl ammonium bromide | Bretol | Fine Organics, Inc. |
| | Ethyl Cetab | Rhodes Chemical Corp. |
| Cetyl trimethyl ammonium bromide | Cetab | Rhodes Chemical Corp. |
| | Bromat | Fine Organics, Inc. |
| Cetyl trimethyl ammonium chloride | Cetac | Rhodes Chemical Corp. |
| Diisobutyl phenoxy ethoxy ethyl dimethyl benzyl ammonium chloride | Hyamine 1622 | Rohm & Haas Co. |
| Dodecyl paratolyl trimethyl ammonium chloride | Hyamine 2389 | Rohm & Haas Co. |
| Fatty alcohol demethyl benzyl ammonium chloride | Decab | Rhodes Chemical Corp. |
| Fatty alcohol dimethyl benzyl ammonium chloride | Octab | Rhodes Chemical Corp. |
| Fatty alcohol dimethyl ethyl ammonium bromide | Ethyl Decab | Rhodes Chemical Corp. |
| Fatty alcohol trimethyl ammonium bromide | Methyl Decab | Rhodes Chemical Corp. |
| n-(Lauroyl colomino formyl methyl) pyridinium chloride | Emulsept | Emulsol Corp. |
| Lauryl dimethyl benzyl ammonium bromide | Laurol | Fine Organics, Inc. |
| Linoleyl trimethyl ammonium bromide | | Rhodes Chemical Corp. |
| 85% Octadecyl and 15% octadecenyl dimethyl ethyl ammonium bromide | Octimet | Rhodes Chemical Corp. |
| Soy fatty alkyl trimethyl ammonium chloride | Arquad S | Armour & Co. |

barrels. The smaller packages are primarily for treating small dairy farm equipment and for small restaurant or bar use in sanitizing dishes and glassware. Drums are sold to food and dairy plants. Some liquid sodium hypochlorite solutions are also supplied, but usually for shipment within a restricted area. Prepared sanitizers are sold directly to the consumer, frequently through distributors. No intermediate processing is required as in the case of disinfectants.

### QUATERNARIES

Quaternary ammonium compounds are becoming more and more widely used in restaurants and bars for sanitizing dishes and glassware and in food processing industries where an odorless product is preferred.

Some basic quaternary ammonium manufacturers prepare and package their products for direct consumer use through distributors. Winthrop-Stearns, Inc., distributes its Roccal in that fashion. Others supply the basic material only to disinfectant and sanitizer manufacturers. Rohm & Haas Co.'s Hyamines, Onyx Oil & Chemical Co.'s B. T. C. Onyxide and Tetrosan are sold on that basis. Other manufacturers sell their products both ways. The accompanying table lists pertinent information on quaternaries.

### COMPARISON OF TYPES

The better hypochlorites are extremely effective at very high dilutions in the absence of organic contamination, and can be provided at relatively low cost. The principal objections are the odor, and the lack of stability even in powdered form. Fresh hypochlorite solutions for plant use must be prepared daily. Effectiveness of hypochlorites depends upon instability and oxidizing action. Consequently, they are somewhat corrosive. They do not provide any residual action, and their efficiency is considerably reduced in the presence of any oxidizable organic matter. On the other hand, because of the low cost, they can be used at a concentration much greater than would be necessary in order to insure effective sanitization when the preceding cleaning operation may not have been too thorough. Speed of action of hypochlorites as well as rate of decomposition and rate of dissipation increases with increasing temperature and with decreasing pH.

The organic chlorine-liberating compounds and chlorinated trisodium phosphate sanitizers have much better stability and less odor, and they are much less corrosive. In order to obtain these characteristics, speed of action and effectiveness at high dilutions have been sacrificed.

Quaternary ammonium compounds are perfectly stable and entirely odorless at the dilutions generally used. They provide almost neutral solutions that are scarcely more corrosive than distilled water but, of course, since they are surface-active, the water solutions are more penetrating and the water itself is corrosive. Quaternaries retain their effectiveness in the presence of moderate amounts of organic contamination somewhat better than hypochlorites, but they are not quite as fast in their action or not as effective at high dilutions, so that recommended usage for both hypochlorites and quaternaries is generally in the same range. Quaternaries are generally used at about 200 ppm and hypochlorites are often used in solutions that provide 200 ppm of available chlorine.

Germicides are the invisible life guards.

Quaternary solutions are used to flush out pipe lines of dairies, breweries, carbonated beverage plants, etc. Solutions can be left in these lines overnight without corrosion and without loss of activity. Also, if applied where the germicidal agent does not have to be rinsed off, the quaternary ammonium compound will provide residual bacteriostatic or fungistatic activity that is restored whenever the surface becomes moist. Of course, in the complete absence of moisture, multiplication of bacteria is not a problem.

### DETERGENT-SANITIZERS

Detergent-sanitizers are a very recent commercial development. These may be in powder or liquid form, and usually combine a quaternary ammonium compound with a compatible non-ionic type synthetic detergent. In the powdered products, there are usually sequestering agents and alkaline detergents, such as soda ash or trisodium phosphate. Combinations containing alkaline detergents and sequestering agents when properly formulated are even more effective in hard water than the quaternary itself is in distilled water. It has been shown that water hardness does have an adverse effect on the efficiency of quaternary sanitizers, although this effect is generally not sufficient to render them ineffective at dilutions usually recommended. The quaternary ammonium compounds cover

(*Turn to page 318*)

*Koppers Co., Inc.*

**Fig. 1—There are about 240 commercial wood treating plants in the United States. Above is an aerial view of one of the larger ones.**

# Developments In Wood Preservatives

by J. OSCAR BLEW, JR., Technologist
Forest Products Laboratory*, Forest Service
U. S. Department of Agriculture

**SPURRED BY POSTWAR SHORTAGE of coal-tar creosote, materials such as chlorinated phenols and copper naphthenate have come up rapidly as commercial wood preservatives. Use of treated wood in housing is growing.**

ALTHOUGH the bulk of wood preservatives are still used for such applications as treatment of railroad ties, telephone poles, and piling, there is a growing trend toward the use of treated wood in housing, particularly in termite-infested areas. This latter field is regarded by some as a potentially large future market for the non-creosote types of preservatives.

## PROBLEM OF PRESERVATION

Treatment with preservatives is generally essential where wood is to be used under conditions that are favorable to attack by decay fungi, insects or marine borers.

Buildings of untreated wood will last many decades when the principles of good construction are followed and the wood remains dry and is away from contact with the ground. Moisture absorbed by wood from the soil, leaky roofs, plumbing, or other sources will, however, encourage the growth of a low form of plant life known as fungi. Some fungi may stain or cause the wood to become moldy on the surface without seriously reducing its strength properties. Such a condition is common when the wood retains moisture only for brief periods. When the moist condition recurs frequently or persists, however, other fungi which cause decay will often attack and deteriorate the wood.

Harmful insects, such as termites, are present in many sections of the United States. Termites are ready to devour untreated wood that is either placed in contact with the ground or is not adequately insulated from ground contact with termite-resistant shields or barriers.

Some woods, such as baldcypress, Western redcedar, and redwood, have heartwood that is highly resistant, although not immune to, fungus and termite attack. These woods can often be used without preservative treatment, but are not available in sufficient quantities to meet all requirements. For most purposes, less decay-resistant woods must be used, and treatment of such woods, has become a large industrial activity (Fig. 1).

Of the various woods used by one railroad for crossties, the average life without preservative treatment was found to be less than 6 years.[11] Southern yellow pine, the most readily available wood in the South, when used without treatment

*Maintained at Madison, Wis., in cooperation with the University of Wisconsin.

for fence posts, will last only about 3 years on an average and less than a year in some cases.[7] Even in the comparatively dry climate of Montana and Idaho, untreated poles of Western redcedar have been found to have an average life of only about 17 years.[23] Crossties, posts, and poles properly treated with a standard wood preservative, on the other hand, should last 25 to 30 or more years.

Marine borers have been found to cause failures in untreated wood structures within a few months. Well-creosoted piling has been found to last from 17 to 25 years or longer in marine-borer-infested waters, depending upon the location of the structure and the kind of borers responsible for the attack. Creosoted piles installed in 1898 in a San Francisco Bay pier by the Southern Pacific Railroad Co. are reported to have had an average life to date of 46.7 years.[12]

## WHAT IS A GOOD PRESERVATIVE?

Essentially, to be effective a preservative must (a) be toxic to wood-destroying organisms or discourage them from inhabiting the wood; (b) have permanence, so that it will not leach out of the wood, volatilize, or sublimate and remain in the wood when protection is needed; (c) be readily available and economical to use; and (d) be safe to handle and use. Such properties of the preservative as color, odor, cleanness, paintability of the treated wood, fire resistance, and moisture repellency must also be considered for special use requirements. With any preservative, enough of the wood must be penetrated to assure good protection (Fig. 2).

Wood that is dry will not decay. It is possible in some cases to impregnate the wood with thermosetting resins, which have good water-repelling properties, thereby reducing moisture absorption by the wood elements and retarding decay and insect attack (Fig. 3). This treatment also controls swelling of the wood. Such resins and their application are, however, too costly to use for wood preservation. There is no economical "waterproofing" treatment yet discovered, particularly for surface application, that will provide satisfactory protection against wood-deteriorating organisms. Water repellents are often useful in retarding moisture absorption by wood during brief periods of exposure, but their preservative value has not been demonstrated for uses where the wood is exposed for long periods to moisture or is used in contact with the ground or water. Paint coatings may even increase the decay hazard by trapping moisture within the wood.

## EVALUATING PRESERVATIVES

Wood preservatives can be tested in the laboratory by accelerated methods just as other materials can. In the case of wood preservatives, however, laboratory tests are useful only for screening purposes; they do not show the probable life of a treated pole or post. This answer must come from actual service.[24]

Toxicity tests in the laboratory are highly desirable for selecting materials that show promise.

Laboratory tests may furnish a good indication of the penetrability and permanence of a preservative. Volatility is indicated by tests on vapor pressure, and water-solubility tests indicate whether or not the material will resist leaching if the treated wood is used in moist or wet locations.

Also useful for screening purposes are accelerated field tests in which small-size wood specimens or stakes impregnated with measured quantities of preservative are set in the ground.[8] These tests go one step beyond laboratory tests and approach service tests in indicating the performance that can be anticipated from a preservative.

The most reliable method for evaluating a wood preservative is to observe the service life of treated units or structures. This involves the keeping of records on treated installations and the making of periodic inspections from the time the installation is started until it is no longer serviceable. Service tests are time-consuming and therefore work a hardship on the promoter of a new preservative. No short cut has yet been found, however.

Service tests on treated poles, crossties, pilings, posts and other wood products are published in the annual Proceedings of the American Wood Preservers Association* and in service committee reports of that Association. Coal-tar creosote, because of its good record of performance since 1865 in the United States, has been accepted as the standard wood preservative where a high degree of protection is required. Zinc chloride, and later chromated zinc chloride, have been considered as standard preservatives where a clean, low-cost treatment for less severe exposures is desired.

Other promising preservatives have been developed, some of which offer advantages over coal-tar creosote and the zinc chloride preservatives; some have now been in use long enough so that their protective qualities in comparison with the standard preservatives are fairly well-established. Others, over a shorter period of time, have shown highly promising results and may ultimately prove superior to, and more economical to use, than coal-tar creosote.

The various kinds of preservatives, their price, and quantities consumed, have been reported in "Wood Preservation Statistics 1947"[21] for the wood preserving industry in the United States and are reproduced in Table I.

## PRESERVATIVE OILS

Oils used more or less commonly as wood preservatives include coal-tar creosote, creosote-petroleum solution (with and without fortification with pentachlorophenol), creosote-coal-tar solution, coal tar, oil-tar creosote, and petroleum oils fortified with either pentachlorophenol or copper naphthenate. Small quantities of wood-tar creosote, water gas-tar, lignite-tar creosote, and water-gas-tar creosote are used principally for blending with coal-tar creosote.

Preservative oils as a general rule are low in water solubility and therefore resist leaching. They generally leave the treated wood with a dark color and an oily or unclean surface that is difficult to paint. Volatile, light-colored petroleum oils containing pentachlorophenol, however, may leave the wood in a clean, paintable condition and with little odor after the petroleum volatilizes.

*Coal-tar creosote.* Coal-tar creosote is the most widely used wood preservative. Its advantages are (1) high toxicity against decay fungi and insects, (2) repellent qualities against marine borers; (3) permanence under a wide variety of conditions, including installations in fresh and salt water (Fig. 5); (4) ease of application; (5) ease of determining the depth of penetration in the treated wood; (6) freedom from corrosive or harmful action on metals and wood; and (7) comparatively low cost in carload lots. The disadvantages of coal-tar creosote are (1) its odor, which is often objectionable in buildings and around foodstuffs that are sensitive to odor; (2) its oily nature and tendency to bleed, which makes the treated wood objectionable to handle and dif-

*1427 Eye St., N.W., Washington 5, D. C.

**TABLE I—CONSUMPTION AND PRICES OF WOOD PRESERVATIVES IN U. S., 1947**

| *Preservative oils, including solids or concentrates used in oil solutions* | *Consumption, gals.* | *Price, cents/gal.* |
|---|---|---|
| Coal-tar creosote | 151,093,856 | 15.5 to 36.0 |
| Creosote-coal tar solution | 64,722,021 | 12.7 to 25.5 |
| Petroleum oils (to be fortified with preservatives) | 65,886,296 | 3.14 to 15.2 |
| Miscellaneous solutions | 1,557,355 | |
| Pentachlorophenol | 6,909,146 (lb.) | 18.08 to 22.0 (per lb.) |
| Copper naphthenate† | 2,632,689 (lb.) | 14.25 to 17.75 (per lb.) |
| *Water-borne salt preservatives* | *Consumption, lbs.* | *Price, cents/lb.* |
| Chromated zinc chloride | 3,282,919 | 3.8 to 10.9 |
| Wolman salts | 1,156,847 | 25.0 to 35.0 |
| Zinc chloride | 527,363 | 5.94 to 8.1 |
| Celcure (acid cupric chromate) | 284,090 | 5.15 to 12.0 |
| Miscellaneous | 1,630,299 | |

† The figures shown represent a concentrated solution containing an equivalent of approximately 8 per cent copper metal.

ficult to paint over; (3) its irritating effects on the skin of some workers, particularly those of light complexion; and (4) its complicated, nonuniform chemical composition.

The lighter, volatile oils of creosote that are present until the wood has been in use for some time may cause the creosoted wood to ignite more easily than does untreated wood. The reverse may be true, however, after these light oils have evaporated or have been removed by weathering.

Service records on creosoted wood products, for the most part, show a long and satisfactory performance. Premature failures can generally be traced to faulty or improper application.

Specifications covering the quality of coal-tar creosote have been prepared by the Federal Government (Federal Specification TT-W-556a), the American Wood Preservers' Association (Standard P 1-48), the American Society for Testing Materials (Standard D 390-36) and by various users of creosoted wood.

Coal-tar creosote is produced principally from coal tar from the high temperature carbonization of coal in coke ovens. Since the creosote is a byproduct of the coal-tar industry, its composition is subject to variation according to demands for various coal-tar components. The extent to which these components can be removed without reducing the wood-preserving properties of the creosote has not been established, although the problem is being examined at the Forest Products Laboratory, as well as by creosote manufacturers and others.

Modern creosotes tend to differ somewhat from the creosotes on which service records are based but, in view of the fact that creosotes have always varied in their properties but have performed well, there appears to be no reason to doubt their ability to provide satisfactory protection when they are properly applied. There is no evidence to indicate that post-war creosote will not perform satisfactorily. There has been a tendency to produce coal-tar creosotes with high-distillation residues (above 355° C.), which may increase bleeding difficulties. The lower-residue oils are therefore preferable for the treatment of poles and other products where bleeding is a serious problem.

*Creosote solutions.* For the past 40 years, coal tar and petroleum oil have been mixed with coal-tar creosote, in various proportions, as a means of lowering preservative costs. These creosote solutions have had a satisfactory record of performance, mostly when used in the treatment of crossties.

Federal Specification No. TT-W-566a, "Creosote-coal-tar Solution," places no limit on the quantities of coal-tar creosote and coal tar present in the solution, but the solution must meet definite requirements as to physical and chemical composition. American Wood Preservers' Association Standard P2-48 for "Creosote coal-tar solutions" includes 4 solutions which must contain, respectively, not less than 80, 70, 60, or 50 per cent by volume of coal-tar distillate, and must also meet requirements as to physical and chemical properties. Federal Specification No. TT-W-568 and American Wood Preservers' Association Standard P3-48 for creosote-petroleum solution stipulate that the solution shall contain not less than 50 per cent by volume of coal-tar creosote.

Creosote solutions, besides costing less than straight creosote, tend to also reduce weathering and checking of the treated wood. The solutions may have a greater tendency to cause bleeding and may penetrate the wood with greater difficulty, particularly since they generally are higher in viscosity than straight creosote. Higher temperatures and pressures during treatment can often be used to advantage, however, to improve penetration when solutions of high viscosity are used.

Since petroleum oil and coal tar are less toxic than straight creosote, creosote solutions are also less toxic. The toxicity of some creosote-petroleum solutions may in fact be less, proportionately, than the percentage of creosote in the solution.[5] Creosotes of high toxicity are therefore desirable for use in creosote-petroleum solutions. Since 1945, whenever it has become necessary to extend creosote supplies by adding various petroleum oils, some preservative users have fortified the petroleum oils in the solutions with such toxic materials as pentachlorophenol and copper naphthenate in order to avoid reducing the preservative effectiveness of the solution.

Creosote-petroleum solutions for which performance records have been favorable have generally contained petroleum oils of the comparatively heavier (specific gravity at 60°F./60° F. not less than 0.96) and higher viscosity types (40 to 60 seconds SUS at 210° F.). The protective qualities of solutions containing lighter oils, such as those of the domestic fuel-oil types, have not been adequately demonstrated.

*Petroleum oils fortified with pentachlorophenol and copper napthenate.* Petroleum oils fortified with chlorinated phenols, principally pentachlorophenol, and copper naphthenate have come into fairly wide use as wood preservatives during the last few years in the United States. These preservatives were first sold as proprietary materials, primarily for surface applications. The chlorinated phenols in volatile light-colored solvents such as mineral spirits were first used for window sash and millwork that required a clean, nonswelling, and paintable treatment.[15] Pentachlorophenol solutions were first used for the treatment of poles and lumber in 1941. In 1945 and 1946, following World War II, pentachlorophenol and copper naphthenate solutions came into large-scale use in this industry because of the shortage of coal-tar creosote. In 1945, for example, 279,881 pounds of pentachlorophenol were used, while in 1946, the industry used 5,289,843 pounds of the preservative in creosote-petroleum-pentachlorophenol solutions and petroleum-pentachlorophenol solutions. During 1946, the industry used 2,269,546 pounds of copper naphthenate concentrates in creosote petroleum-copper-napthenate solutions.[21] The petroleum oils used in these solutions varies from the Diesel-oil type to the heavier types ordinarily used in creosote-petroleum solutions.

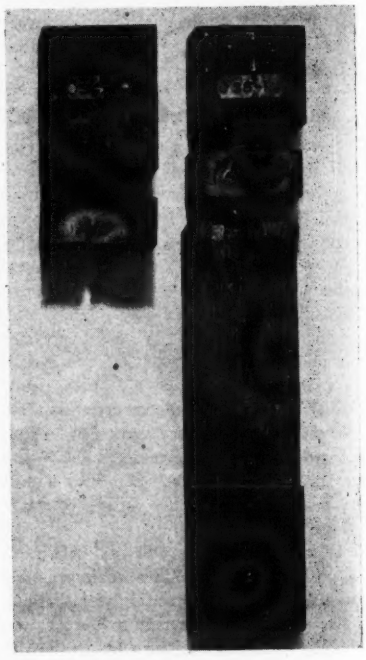


**Fig. 2—These treated test stakes become premature victims of decay and termites because of inadequate penetration of the preservative. The stakes have been cut open to show the riddled, untreated center sections.**

Large-scale users, such as the telephone companies and the Rural Electrification Administration, have developed specifications covering the formulation and use of pentachlorophenol and copper naphthenate solutions. Federal Specification TT-W-571 covers pentachlorophenol, and the American Wood Preservers' Association has recently developed Standard P8-48 covering both pentachlorophenol and copper naphthenate. These two agencies, however, have not yet prepared standards covering either the treating solutions of these preservatives or their application for various use requirements.

Committee 4 of the American Wood Preservers' Association recommended in its 1948 report[4] that treating solutions with pentachlorophenol be required to

contain 5 per cent of this chemical while those containing copper naphthenate be required to have a copper metal concentration of not less than 0.75 per cent. Also suggested by this committee in its 1947 and 1948 reports[3, 4] were three types of petroleum oils for use in solutions of pentachlorophenol and copper naphthenate: (1) a distillate oil intended for the treatment of lumber which may be painted several months after treatment and meanwhile dried under favorable conditions;* (2) residual oil intended primarily for use in the treatment of poles and similar products; and (3) residual oil intended primarily for use with substantial amounts of creosote. Attention was called to the fact that the performance of these preservatives is influenced by the character of the petroleum oil in the treating solution, and that best results are obtained with fairly heavy oils of low volatility. The committee recommended further that pentachlorophenol and copper naphthenate solutions not be used to treat piles.

Service and field tests on wood treated with petroleum oils containing 5 per cent of pentachlorophenol or copper naphthenate equivalent to 0.5 per cent or more of copper metal, show these preservatives to provide a high degree of protection against decay fungi and termites when the wood is properly treated.[3, 4, 7, 8, 14, 17] It is too early to predict their ultimate protective properties in comparison with coal-tar creosote. They are known, however, to provide much less protection than creosote against marine borers. Navy tests[25] have shown wood well-impregnated with copper naphthenate solution to resist marine borer attack for limited periods. In other tests southern yellow pines heavily impregnated with No. 2 fuel oil containing five per cent of pentachlorophenol solution were severely riddled by borers in from 1 to 2 years.

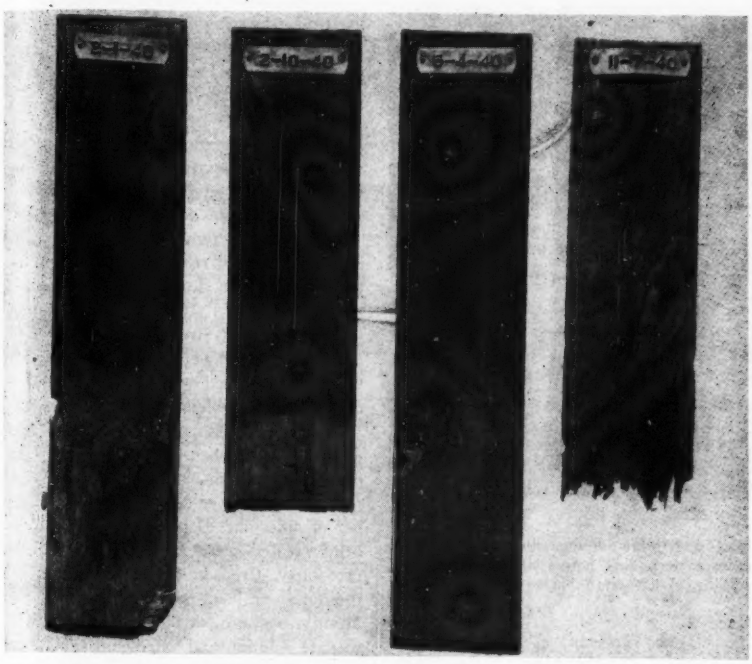



**Fig. 3—Wood impregnated with phenol-formaldehyde resin has some resistance to decay and termite attack. Stakes 2-1-40 and 2-10-40, showing only light attack, are of plywood impregnated with resin. Stake 5-4-40 shows the good condition of the resin-impregnated veneer, a section of which has been torn off to show severe termite attack in the untreated core. Stake 11-7-40 is untreated wood. The stakes were in test four years.**

Pentachlorophenol does not appreciably alter the natural color of the wood, but copper naphthenate gives it a green color. The properties of the wood treated with petroleum oils containing these preservatives, with respect to cleanness, paintability, color, odor, and combustibility, are dependent upon the properties of the petroleum oil used. Pentachlorophenol in the dry form and in solutions irritates the skin of workers but with careful handling and the use of suitable protective clothing it is possible to avoid harmful effects. The use of "bloom" preventatives, such as ester gum, is required in pentachlorophenol solutions with volatile solvents to prevent the formation of irritating crystals of the preservative on the surface of the wood after treatment.

*Petroleum oils that remain in the wood in substantial quantities after treatment are likely to interfere with painting. When painting after treatment is essential, the user is cautioned either to make his own painting tests or to require the supplier of the preservative or treatment to furnish painting instructions and evidence of satisfactory performance with respect to paintability.

## WATER-BORNE PRESERVATIVES

Wood preservatives such as zinc chloride, chromated zinc chloride, Wolman salt (Tanalith), Celcure (acid cupric chromate), zinc meta arsenite, and Chemonite (ammoniacal copper arsenite) are injected into the wood as water solutions. These preservatives are included in the Federal wood preservative specifications, and some are covered by standards of the American Wood Preservers' Association. They are employed principally in the treatment of wood for uses where it will not be in contact with the ground or water and where the treated wood requires painting. As a general rule, they are less resistant to leaching and do not perform as satisfactorily as do the preservative oils under conditions favorable to leaching. The leaching resistance of some of these preservatives has been developed to the extent that good performance can be expected in ground contact or in otherwise wet installations, but they are still not generally recommended for such conditions.

Water-borne preservatives leave the wood surface comparatively clean and free from objectionable odor. Since water is added during treatment, the wood must be dried after treatment to the moisture content required for use. Zinc chloride and chromated zinc chloride are frequently used as fire retardants for wood but at retentions somewhat higher than those used only for wood-preserving purposes.

With the exception of zinc chloride, the water-borne preservatives must be used at lower treating temperatures (100° to 160° F.) because of their instability at the higher temperatures used with preservative oils. This may involve some difficulty when higher temperatures are needed to obtain good treating results in woods such as Douglas-fir.

*Zinc chloride and chromated zinc chloride.* Zinc chloride and chromated zinc chloride are covered respectively in Federal Specifications Nos. TT-W-576a and TT-W-551 and in American Wood Preservers' Association Standard P5-48. Until 10 years ago, zinc chloride was the most extensively used water-borne preservative in the United States. Its principal advantages are its low cost, cleanness, and lack of fire hazard. Service records on crossties treated with zinc chloride indicate an average life of 13 to 15 or more years, as compared with an average life of 25 to 30 or more years from crossties treated with coal-tar creosote.[11] Zinc chloride solutions were at one time used in mixture with creosote for the treatment of crossties and construction timbers, but this use has been discontinued as the zinc chloride does not give as satisfactory performance as some of the other extenders for creosote already mentioned. Since 1938 there has been a gradual displacement of zinc chlo-

ride by chromated zinc chloride and other water-borne preservatives.

Chromated zinc chloride was developed and promoted about 1934. According to the above-mentioned specifications, it must contain not less than 77.5 per cent of zinc chloride and not less than 17.5 per cent of sodium dichromate dihydrate. The chromated zinc chloride is claimed to have greater resistance to leaching than plain zinc chloride. Tests by the Forest Products Laboratory on stakes and posts and by the Atchison, Topeka and Santa Fe Railroad on posts treated with both preservatives do not yet show conclusively that one provides greater protection than the other,[7, 8, 9] although accelerated field tests by others[6] show some superiority for the chromated form.

*Wolman salts.* Wolman salt (Tanalith) is covered by U. S. Patent No. 1,957,873 (1934). Its approximate composition, according to Federal Specification TT-W-573 and American Wood Preservers' Association Standard P5-48, is 25 per cent sodium fluoride, 25 per cent disodium hydrogen arsenate, 37½ per cent sodium chromate, and 12½ per cent dinitrophenol. Service records on various types of wood structures treated with this preservative, and not used in contact with the ground or water, show performance to be generally favorable.[2]

*Celcure (acid cupric chromate)* is covered by U. S. Patents Nos. 1,684,222 (1926) and 2,041,655 (1936). Its composition, according to Federal Specification TT-W-546, is approximately equal quantities of copper sulfate and sodium dichromate solution, and the mixture should contain a sufficient quantity of free acetic acid or chromic acid to maintain the preservatives in solution under operating conditions. Tests on stakes and posts exposed to decay and termite attack indicate that wood well-impregnated with Celcure can give good service.[7, 8, 16] Marine-borer tests by the Forest Products Laboratory and the U. S. Navy[25] have shown that wood thoroughly impregnated with at least one pound of Celcure per cubic foot has some resistance to attack. The protection furnished by this preservative, however, is much less than that provided by the standard treatment with creosote.

*Zinc meta arsenite (ZMA).* This preservative is covered by U. S. Patents Nos. 1,659,135 (1928) and 1,984,254 (1934). Federal Specification No. TT-W-581 and American Wood Preservers' Association Standard P5-48 require the zinc meta arsenite in treating solutions to be composed approximately of 60 parts of arsenious acid and 40 parts of zinc oxide, with sufficient acetic acid to keep the preservative in solution under operating conditions. Zinc meta arsenite has been in use for nearly 20 years, but recently its use has been declining. It is now used for the treatment of lumber. Service records on treated crossties,[11] poles[1] and posts[7, 9] show that this preservative provides considerable protection, but generally less than does coal-tar creosote.

*Chemonite (ammoniacal copper arsenite).* Chemonite was developed about 1925, is covered by U. S. Patent No. 2,149,284 (1939), and has been in commercial use for about 14 years.[13] According to Federal Specification No. TT-W-549, the components in a typical Chemonite treating solution are 1.84 parts of copper hydroxide, 1.3 parts of arsenic trioxide, 2.8 parts of ammonia and 0.05 parts of acetic acid, with water sufficient to make 100 parts of solution. The solution strength is adjusted as necessary according to the retention of dry chemicals desired in the treated wood. The net retention of preservative is calculated as pounds of copper oxide plus arsenic trioxide in the proportion of 1.5 to 1.3 parts.

Service records on Chemonite-treated structures show that this preservative provides good protection against decay and termites.[13] The limited period of service, however, is insufficient to indicate the comparative value of Chemonite and coal-tar creosote. Chemonite adds some to the life of untreated wood exposed to attack by marine borers, but its use cannot be recommended as a substitute for creosote when long service is required or when the treated structure is to be used in heavily infested waters.

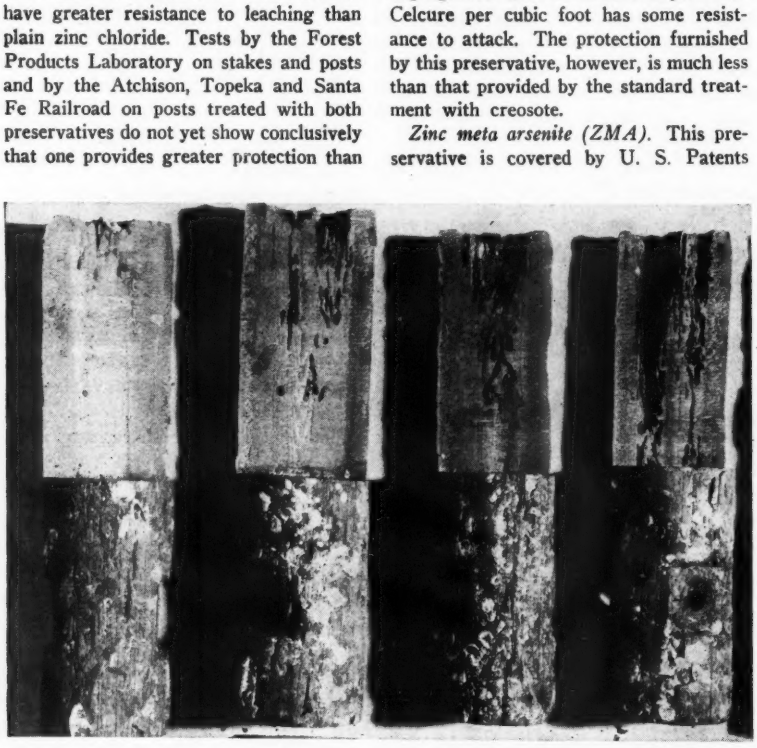


**Fig. 4—These douglas fir and southern yellow pine piles were impregnated with 12 to 22 lbs. per cu. ft. of coal-tar creosote. After exposure to marine borers at Pensacola, Fla., for 24 to 25 years, attack is still confined principally to untreated heartwood.**

## END-USE PATTERN

Statistics on consumption of preservatives in 1947[21] give an end-use pattern that is still quite accurate.

Crossties and switch ties used by railroads constituted roughly 44 per cent of the volume of wood treated with preservatives in that year. Of the total volumes of these products treated, 98 per cent of crossties and 99 per cent of the switch ties were treated with either creosote or creosote-petroleum solution.

Poles and crossarms for telephone and power lines constituted about 41 per cent of the total volume of wood treated. Approximately 61 per cent of the total number of poles and 84 per cent of the crossarms treated were treated with straight creosote. Creosote-petroleum solutions, creosote-petroleum-pentachlorophenol solution, creosote-petroleum-copper naphthenate solution and petroleum-pentachlorophenol solution were other preservatives used in treating a substantial volume of poles. These petroleum solutions, chromated zinc chloride and Wolman salts were used in the treatment of crossarms not treated with straight creosote.

## PROPRIETARY PRESERVATIVES

The foregoing discussion and figures on the consumption of preservatives do not include a number of trade-name preservatives of the type sold in gallon lots by retail paint, hardware, and lumber dealers. Some of these proprietary products contain preservatives of recognized value and concentration, such as pentachlorophenol, copper naphthenate, and straight coal-tar creosote. Others contain materials of doubtful preservative value or low concentrations of recognized materials.

The user should recognize the value and limitations of proprietary preservatives of the ready-to-use type. Proprietary preservatives vary widely in cost. They are seldom more effective than straight

## TABLE II—CONSUMPTION OF PRESERVATIVES BY TREATING PLANTS OF THE UNITED STATES, 1928-1946 INCLUSIVE

*(All figures in thousands)*

| Year | Creosote[1], gals. | Mixtures of creosote and petroleum, gals. | Zinc chloride, lbs. | Chromated zinc chloride[2], lbs. | Wolman salts[4], lbs. | Zinc-meta arsenite[4], lbs. | Celcure[5], lbs. | Pentachlorophenol, lbs. | Miscellaneous preservatives: Salts, lbs. | Miscellaneous preservatives: Liquids, gals. |
|---|---|---|---|---|---|---|---|---|---|---|
| 1928 | 222,825 | [6] | 23,524 | [6] | [6] | [6] | [6] | [6] | 443 | 417 |
| 1929 | 226,374 | [6] | 19,848 | [6] | [6] | [6] | [6] | [6] | 1,188 | 38 |
| 1930 | 213,904 | [6] | 13,921 | [6] | [6] | [6] | [6] | [6] | 1,770 | 202 |
| 1931 | 155,437 | [6] | 10,323 | [6] | [6] | [6] | [6] | [6] | 958 | 120 |
| 1932 | 105,671 | [6] | 7,669 | [6] | [6] | [6] | [6] | [6] | 869 | 92 |
| 1933 | 85,180 | [6] | 4,991 | [6] | [6] | [6] | [6] | [6] | 627 | 48 |
| 1934 | 119,049 | [6] | 3,222 | [6] | [6] | [6] | [6] | [6] | 805 | 5 |
| 1935 | 124,747 | [6] | 4,080 | [6] | [6] | [6] | [6] | [6] | 966 | 2 |
| 1936 | 154,712 | [6] | 4,127 | [6] | [6] | [6] | [6] | [6] | 1,804 | 4 |
| 1937 | 183,574 | 54,490 | 3,591 | 1,242 | 989 | 330 | [6] | [6] | 331 | 9 |
| 1938 | 166,183 | 55,652 | 3,010 | 1,819 | 870 | 194 | [6] | [6] | 510 | 19 |
| 1939 | 163,864 | 50,628 | 1,951 | 2,570 | 1,200 | 215 | [6] | [6] | 427 | 15 |
| 1940 | 174,625 | 64,370 | 1,220 | 3,960 | 1,062 | 201 | 242 | [6] | 401 | 239 |
| 1941 | 215,467 | 62,864 | 1,403 | 4,382 | 1,656 | 268 | 310 | [6] | 992 | 136 |
| 1942 | 216,347 | 69,264 | 1,063 | 3,987 | 1,307 | 239 | 249 | [6] | 5,593 | 194 |
| 1943 | 177,786 | 53,007 | 1,014 | 2,107 | 769 | 53 | 134 | [6] | 20,932 | 23 |
| 1944 | 188,758 | 67,733 | 671 | 2,165 | 782 | 11 | 105 | [6] | 2,315 | 48 |
| 1945 | 195,225 | 63,875 | 419 | 2,328 | 732 | 17 | 172 | 279 | 1,348 | 7 |
| 1946 | 173,310 | [7]101,601 | 780 | [8]93,065 | 1,669 | 14 | 286 | 5,289 | [9]1,378 | 58 |

[1] *Includes domestic and imported distillate coal-tar creosote (including that used in solutions of creosote and petroleum), solutions of creosote and coal tar, refined water-gas tar and water-gas tar solutions.*

[2] *Includes various percentage solutions of creosote and petroleum (72,340,123 gallons), the creosote and petroleum contents of creosote-petroleum-pentachlorophenol (15,384,011 gallons), petroleum-pentachlorophenol (5,506,332 gallons) and creosote-petroleum-copper naphthenate (8,361,837 gallons.) The creosote content of these solutions is also included under creosote. Prior to 1937 this item was shown as straight petroleum. The actual quantity of petroleum used in solutions of creosote and petroleum in 1946 was 57,165,061 gallons.*

[3] *Included in zinc chloride prior to 1937.*

[4] *Included in miscellaneous preservatives—salts prior to 1937.*

[5] *Included in miscellaneous preservatives—salts prior to 1940.*

[6] *No statistics.*

[7] *Includes 521,600 lbs. used in fire retardant treatment.*

[8] *Includes 677,435 lbs. used in fire-retardant treatment.*

*Note: 2,269,540 pounds of copper naphthenate which was reported used in 1946 is not included in the above table.*

This table is based on data obtained from PROCEEDINGS OF THE AMERICAN WOOD PRESERVERS ASSOCIATION, 1947.

coal-tar creosote, and are generally recommended for surface applications, which do not provide a high degree of protection. Promoters of preservatives for surface application often claim superior penetrating qualities; long protection against marine borers; good decay and termite protection for poles, posts, and other wood products used in contact with the ground; improved seasoning of green wood; and good waterproofing characteristics. These claims, however, are in disagreement with actual experience and scientific facts.

Volatile petroleum oils (such as mineral spirits or kerosene) containing 5 per cent of pentachlorophenol or an amount of copper naphthenate equivalent to 1 per cent of copper metal,* have been found to be useful in prolonging the life of wood when two coats are applied by brushing, or the wood is soaked in them for 15 minutes or longer. This is true especially around wood joints subject to rain seepage, when the wood is not in contact with the ground.[22]

For wood that is in contact with the ground, is constantly exposed to moisture, or is exposed to attack by marine borers, however, the protection provided by surface applications is very limited.[8, 16, 18] Furthermore, checking and mechanical abrasion of the wood soon reduce the effectiveness of surface applications. Such applications cannot therefore be recommended for such severe exposure conditions. Nor are they sufficiently dependable for above-ground uses, as in buildings where replacement of a deteriorated member is likely to result in high costs and serious inconvenience to the owner.

Oils of low viscosity do often penetrate easily treated wood, such as sapwood pine, more deeply than oils of higher viscosity, such as creosote. With either heartwood material or the sapwood of resistant species, such as aspen, however, the improvement in penetrating properties of low-viscosity oils is seldom significant.

Proprietary preservatives sometimes contain water-repellent materials such as waxes and resins. Navy Department Specification 52W5, Wood Preservative, Water-repellent* dated April 16, 1945, may be referred to by those wishing to purchase these preservatives. Attention has been called earlier in this article to the value and limitations of water repellents. Additional information on water repellents and water-repellent preservatives can be obtained from the Forest Products Laboratory, Madison 5, Wis.[10]

*As recommended in National Bureau of Standards Recommended Commercial Standard TS-4578 for copper naphthenate for surface application.

*Copies may be obtained from Bureau of Supplies and Accounts, Navy Department, Washington 25, D. C.

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A CI REPORT ON

# UREA AND MELAMINE RESINS Press Toward New Goals

by JAMES R. DUDLEY
American Cyanamid Co.
New York, N. Y.

**UREA RESINS HAVE BEEN COMMERCIAL PRODUCTS since the 1920s, but melamine resins were introduced only ten years ago. Together they constitute a 100,000,000-pounds-per-year business, of which the melamines constitute 15 per cent. They have attained this volume by virtue of their hardness, light color, and many other desirable properties. More important for the future: many fields of application are just now being scratched and still others are virtually uncultivated.**

UREA and melamine resins belong to a class of resins known as the thermosetting type. The intermediates which are used for the various applications are available in many forms, some of which are soluble in water or in organic solvents, and all of which are fusible or partly fusible. They are converted by the action of heat or catalysts, or both, to an insoluble and infusible state. In the cured form, the resins are odorless, tasteless, and generally inert chemically. Among their outstanding qualities are their lack of color and their hardness, non-inflammability, and excellent electrical properties.

## MOLDING COMPOUNDS

In most cases, one of the primary purposes of the early inventions in the field of urea-formaldehyde condensation products was the production of cast objects which were hard and transparent, and these efforts were directed particularly towards the development of glass substitutes. Compression-molding techniques were also developed for the urea resins so that objects of various shapes could be made. Although cast and molded objects could be satisfactorily made, they lacked permanence. This difficulty arose from the fact that a completely water-resistant product could not be made. The cured resins were substantially dry, but when they were exposed to a humid atmosphere, water was absorbed. Then, on exposure to a dry atmosphere, this moisture was again lost. As a consequence of continued absorption and loss of moisture, the surface of the resin lost its luster and crazing developed. In addition to this, internal strains were produced either from the change in moisture content or from changes in the chemical structure of the resin so that internal cracks were formed in the resin.

### CELLULOSE WAS ANSWER

As a result, urea molding resins were not developed commercially until the discovery of the beneficial effects of cellulose fillers. However, development was still slow because of a number of factors, particularly the water sensitivity of urea resins, especially to hot water. Because of this, some efforts were made to develop resins prepared from thiourea. While these were more satisfactory from the standpoint of water resistance when fully cured, curing was much slower than for the urea resins, and hardening of the resins could not be accomplished in a sufficiently short time to make them desirable as commercial molding resins. The next step was to attempt a compromise by the use of mixtures of urea and thiourea. Such mixtures did produce resins having faster cure than the thiourea resins and better water resistance than the urea resins. However, staining of the molds encountered in practice and further development in this direction was arrested when satisfactory straight urea resins were developed.

These resins were filled compositions containing some form of cellulose as a modifier, the principal material being a refined type known as α-cellulose, although other materials, such as wood flour and cotton fibers have been used. The use of these fillers minimized the strains present in the unmodified resins and there are indications of some sort of bonding between the urea resin and the cellulosic filler. At any rate, it has been shown that the filled resins are much more insensitive to climatic and moisture conditions.

The use of such modifiers resulted in the development of resins which could be molded to give light-colored, translucent objects. The transparency of the unmodified urea resin was lost, but in its place it was found that the translucent materials provided a brilliancy and depth of color that could not be obtained in other types of thermosetting resins. The particular advantage of the urea resins was that white and pastel shades could be

obtained, and this factor was responsible for the use of urea resins in decorative applications in which the phenolics were unsuitable because of their darker color.

There are a number of methods by which the filled urea molding compounds can be prepared. Basically, all of these involve impregnation of the filler with a reacted urea-formaldehyde syrup and heat treatment to remove water and to advance resin formation to a stage which permits the product to be molded. In one of the methods, which might be called the wet process, urea is dissolved in aqueous formaldehyde and reaction is brought about under controlled conditions of pH and temperature. The filler is then impregnated with this solution. Ordinarily, the amount of filler used is such that 100 parts of the final composition contains 30 to 40 parts of filler. After thorough mixing the material is dried, usually in thin layers in an oven under controlled conditions of temperature and humidity. The dried material is then blended with modifiers. These may include mold lubricants, such as zinc sterate, pigments, and catalysts. The latter are acidic materials or materials capable of developing acidity so that the molding time is reduced. The blend is ground to a fine state to insure uniformity, and this operation is generally carried out in a ball mill. The powder obtained from the ball milling operation has a low density and as a result, a substantial reduction in volume would occur if this material were molded. It is therefore desirable for some uses to densify the powder, and one method of doing this is to heat the material in a Banbury mixer. Partial fusion of the powder occurs so that the volume of the material is reduced. The final operation consists in cutting or chopping the material so that the product is in granular form.

The dry process is less common. This involves the dehydration of a urea-formaldehyde reaction product to produce a dry resin, which may be blended with filler and modifiers. After blending, the mixture may be heat treated to advance it to a moldable stage. This may be accomplished by the use of a Banbury mixer or by treatment on hot differential rolls, such as those which are used for compounding rubber. The particle size of the product is then reduced to a range suitable for molding.

## MELAMINES MUCH LATER

While urea resins were developed and made commercially available prior to 1930, the development of melamine resins came at a much later date. Although experimental work in the early 1930s both here and abroad had shown that melamine resins have properties which are superior to those of urea resins in several respects and which would make them commercially attractive, melamine itself was a rare chemical which had been prepared only on a laboratory scale. It was therefore necessary to develop an economical process for the production of melamine before the melamine resins could be made on a practical basis. Research on this problem resulted in the development of the industrial production of melamine in the U. S. during 1939. Work had also been in progress in the meantime on the development of the melamine resins, and they were also offered on the market at this time. Molding resins were among the first which appeared, and, as in the case of urea, the first materials were filled compositions containing α-cellulose. Later developments included the use of asbestos, chopped cotton fabric, and glass fibers as fillers.

Because of the similarities in the reaction of urea and melamine with formaldehyde, the processes used for the production of urea resins were readily adaptable with modifications for the production of melamine resins. In general, the reaction of melamine with formaldehyde is more difficult to handle. However, either the wet process or the dry process may be used.

When molded, these resins become insoluble, infusible, odorless, tasteless, and generally inert chemically. The finished materials have a hard, permanent surface finish so that objects which are subject to considerable handling and wear do not deteriorate with use. The urea moldings are unaffected by organic solvents, oils, or greases. There is no absorption, swelling, or change in appearance. Although they do absorb water to some extent, they are insoluble in water and no deleterious effect is observed. (Repeated alternating exposure to water and drying is more severe than continuous exposure.)

Molded urea resins combine a high order of strength and hardness with considerable shock resistance. Within their temperature limitations, they have outstanding electrical properties. They have high dielectric strength, high arc resistance, and a low order of power factor. The electrical properties are influenced very little, if at all, by high humidity or water exposure.

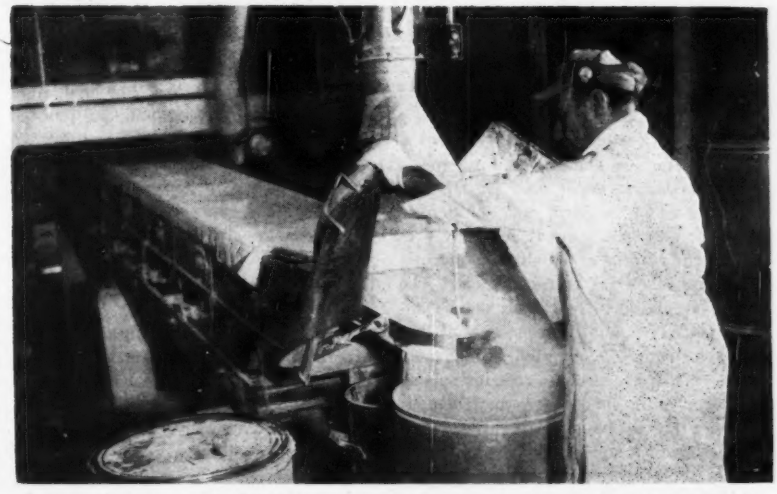
## GOOD PROPERTIES

The properties of melamine resins are equal in every respect to those of urea resins, and many properties are markedly superior to those of urea resins. Because of this, the melamine resins are more versatile materials, and they can be used to advantage in many applications for which the urea resins are unsatisfactory. In addition to the alpha-cellulose filled material, melamine resins are also available with chopped cotton fabric and asbestos as fillers.

The hardness of melamine resins is equal to, and in most cases superior to, that of the urea resins so that the surfaces of objects made with melamine resins are remarkably permanent and resistant to abrasion and wear.

The strength varies somewhat depending upon the filler and the grade of resin. In general, however, the strength of melamine resins is comparable to that of urea resins with one notable exception. This is the chopped fabric-filled resin, developed for its superior shock resistance and which has a combination of good flexural strength and excellent impact strength.

The electrical properties of the melamine resins are as outstanding as those of the urea resins with the added advantage of greater heat resistance. Although the urea resins may be exposed for a short time to temperatures as high as 250° F. without harm, the maximum temperature for continuous exposure is 180° F. Alpha-cellulose filled melamine resins, on the other hand, may be used at temperatures up to that which the cellulose begins to undergo change. They are generally used within the range of



Before packaging, urea-formaldehyde molding powders are passed over a covered vibrating table.

—70° F. to 210° F. Greater heat resistance is obtained with the chopped fabric-filled resin, and the heat resistance of the mineral-filled resin is outstanding. This resin may be used at temperatures as high as 300-400° F. or 150-300° C. Arc resistance is unequalled in any synthetic plastic now produced commercially.

## LAMINATING RESINS

Closely allied to the molding resins are those which are used for laminating purposes.[53] The operations involved are quite similar, and the nature of the final product is much the same except that it is in the form of sheets rather than of objects which may have complicated shapes.

The earlier urea resins and urea-thiourea resins used in this field have now been largely superseded by melamine resins because of their superior water resistance. Although some urea-melamine resins are available and are used to some extent, the straight melamine resins are of more importance because of their superior properties, and the discussion will therefore be confined to this type.

Large mixing kettles are employed in the reaction of urea or melamine with formaldehyde.

The melamine resins used for laminating may be in the form of a solution or a solid. The solid form is generally preferred for reasons of stability of the resin and economies in transportation. The resins are made in much the same manner as the molding resins except that resin formation is arrested at an early stage so that the product remains soluble in water or in aqueous organic solvents. On a practical basis, there are several ways in which the resins may be made. All of these involve the reaction of formaldehyde with melamine under controlled conditions of pH and temperature. The reaction product may then be processed in various ways to obtain a solid resin. One method, which is primarily of interest for laboratory preparations involves cooling the solution to induce precipitation of the condensate. The solid may be filtered from the reaction mixture and dried in thin layers in forced draft ovens under controlled conditions of humidity and temperature, or the wet product may be simply put on trays without filtration and oven dried. The drying conditions are controlled so that the adherent water is removed without effecting excessive resin formation, and the dried material is ground to give a product in the form of a powder.

A second method, and a more practical one, consists in spray drying the solution of the resin. Here again, the operation must be carefully controlled to produce the desired product. In this method, the product is obtained directly in powder form. The third method, which is also a practical one, involves the distillation of water from the kettle under reduced pressure until the resin is in the form of a syrup which solidifies upon cooling. The liquid resin melt is discharged from the kettle and allowed to cool in trays, and the solid slabs are then ground to powder form.

### TECHNIQUES OF USE

In use, the resin is dissolved in an appropriate solvent, which may be water or an aqueous organic solvent such as aqueous alcohol. The solids content of the solution is usually 40-60%, the concentration depending upon the filler which is to be treated. This solution is used in a bath through which the stock to be impregnated is passed. This may be paper, cotton fabric, glass fabric or mat, or asbestos paper or fabric. The amount of resin picked up by the filler as it passes through the bath is regulated by squeeze rolls. If a pigmented surface is desired, the resin solution is ground in a ball mill with pigments, and viscosity modifiers or other materials may be added in this operation. The mix is then applied to the filler with a roll coater or knife coater so that a uniform surface is obtained.

After impregnation or coating, the material is fed through a drying oven, where further resin formation occurs. The drying speed and temperature are carefully controlled so that the resin formation is carried as far as possible consistent with adequate flow when the material is laminated. The volatile content of the dried material is used as a control, and this may vary from 2-6%. Accurate control is desirable to obtain the best flow characteristics and to prevent blistering in the press. The optimum volatile content will depend upon the equipment and application in each case.

After drying, the material may be cut and used directly, but it is usually rerolled and stored until needed. The material may be stored for several weeks, if necessary, without changing appreciably. It is then cut to proper size for laminating, and assemblies are built up to the desired thickness between steel plates and grouped into packs for insertion into the press opening. The assembly is then heated under pressure, the conditions depending upon the thickness. The time required for cure may vary from a few minutes for thin sections to an hour or more for very thick laminates.

Because the resin itself is colorless, and because it is resistant to color change in use, laminates can be made in any desired color combination. The surface of the laminate is remarkably permanent and resistant to abrasion. No other resin has been developed for this use which has the hardness and mar resistance of melamine resins. These materials are unaffected by solvents, oils and grease, and they have excellent resistance to staining by food, ink, and other materials with which they may ordinarily come in contact. They do have a slight water absorption, but they are unaffected by moisture conditions or by contact with mild acids and alkalies. They have excellent strength characteristics and outstanding electrical properties. The Fiberglas laminates provide a combination of electrical properties and heat resistance unequalled in other types of resins. Their extremely good arc resistance and their non-inflammability recommend their use for electric panel boards, and they were very extensively used for this purpose during the war.

Aside from their regular industrial uses,

there are many possibilities for fabrication of melamine laminates for decorative and utilitarian purposes. Thin laminates in sheet form have been widely used for table tops, bar tops and wall paneling and their use in this field is growing rapidly.

Many possibilities also exist for the fabrication of self-supporting laminates. Because melamine resins are somewhat more expensive than phenolic resins, it is customary to use the cheaper resins in the core, where color is not important. Other materials, such as the various pressed wood boards or plywood, may also be used as the core.

A similar application involves the impregnation of wood with a resin intermediate and the application of heat to provide objects of improved hardness, strength and water resistance. Both urea and melamine resins have been used experimentally for this purpose, but the urea resins have undergone more extensive development for this use. Wood treated in this manner has found use in the fabrication of airplane propellors and of smaller objects such as knife handles.

## RESIN ADHESIVES

A third field of application for the urea and melamine resins is that of adhesives. This application is quite similar to laminating uses both in the type of resin used and in the method of using the resin. One of the main differences lies in the fact that whereas the fillers used to assemble a laminate are actually impregnated with the resin, for adhesive uses the resin is used as a bond between wood or other surfaces, and efforts are made to prevent the penetration of the resin into the material being bonded. The requirements for a resin adhesive call for a soluble type, preferably one which is soluble in water, which has adequate viscosity to permit spreading without penetration. Although superior properties are obtained through the use of melamine resins, those used in the largest volume are urea resins and urea-melamine resins. This is primarily due to economic factors since these materials must compete with phenolic resins and various protein type glues.

As in the case of the laminating resins, the preparation of adhesive resins is similar to that of the molding resins with the exception that resin formation is arrested at an early stage so that the product is soluble. However, sufficient resin formation must be brought about so that the product has a proper working viscosity. The condensation of formaldehyde with the urea or melamine is carried out under carefully controlled conditions until the desired degree of reaction has occurred. The product may then be worked up in various ways, depending upon the form in which it is to be made. Liquid products are obtained by concentrating the reaction product under reduced pressure under controlled conditions of pH and temperature until the desired solids content is reached. Dry products may be processed in several ways, one of which consists in spray drying the solution so that a dry powder is obtained. Both dry and liquid resins are supplied to the trade, and the choice of type to be preferred depends primarily upon the stability of the resin and convenience in use. The dry powders are stable for a year or more if kept cool and dry. The liquid resins, on the other hand, have limited stability. They remain usable for about three months, but it is more convenient to prepare the working mix from them.

It is general practice to use extenders with the urea resin adhesives. Rather generous proportions of these may be used so that the cost factor is reduced to a point which approaches that of the older glues. Various cereal flours, wood flours, and walnut shell flours are among those used for this purpose. In addition to reducing the cost of the adhesives, the extenders offer other features. One of these is that they serve as carriers for the resin so that the amount of resin in the glue line is reduced and they serve as absorbents so that penetration into the bonded material is prevented. The extenders also provide greater bonding strength up to a certain point. The actual amount of extender used must be carefully worked out since the use of too large a quantity results in a weaker bond.

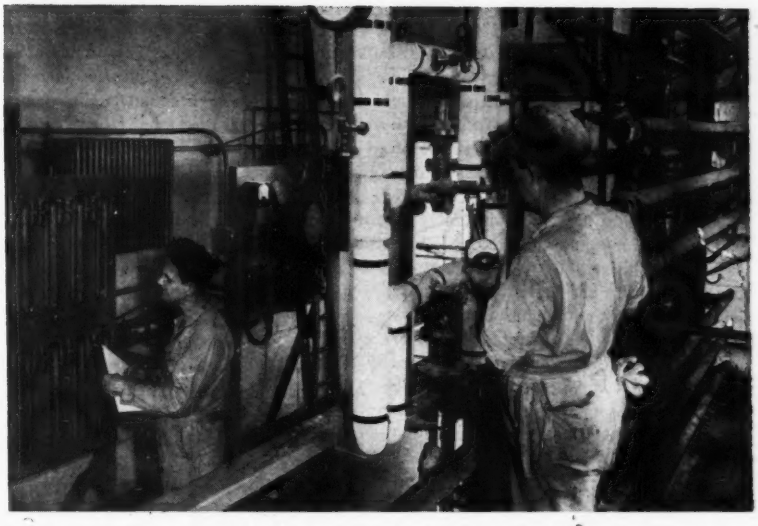
It is also general practice to use catalysts with the resins to accelerate hardening. These are acidic materials or materials capable of developing acidity in use. The nature of most of the catalysts is proprietary and protected. Ammonium chloride is a constituent of many of these catalysts.

### FORMULATED PRODUCTS

Some resins are supplied with the extenders and catalysts incorporated in them. This is particularly true of the dry powders, and such materials require only the addition of water for use. In other cases, particularly with the liquid products, the extenders and catalysts are blended and supplied in a separate package with the resin. These are mixed in the proper proportions with water at the time of use.

After the working mix has been prepared, the working life depends upon the temperature and upon the nature and the amount of catalyst. It may vary from two hours or more for cold setting resins to eight hours or more for hot setting resins. The resin adhesive is applied to the stock by means of mechanical spreaders with rubber or steel rolls. Once applied, the assembly time, or the maximum allowable time before pressing, is usually about twenty to thirty minutes, although some of the urea-melamine resins may have an assembly time as long as four or five weeks.

A good adhesive should be stronger than the material which it bonds. While shear strength values are available for



Progress of melamine-formaldehyde syrup formation is followed in the reaction control room.


## REPRINTS

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wood panels bonded with these resins, the figures are mostly significant on a comparative rather than an absolute basis. Nearly complete wood failure occurs in all cases so that the values depend upon the strength of the wood. Rather than to cite such figures, let us describe in a general way the features which recommend the use of these resins. They are rapidly replacing the older protein types of adhesives for many applications. This is primarily due to the increased moisture and water resistance and because they are vermin and fungus proof. Furthermore, the lower water content of the urea adhesive intermediate minimizes warping in the completed structure. While the water resistance of the urea resins is good, that of the urea-melamine resins is excellent.

### SPEEDS PRODUCTION

Although many thermoplastic materials are good adhesives, the assembly must be cooled before the pressure is released. This requirement appreciably retards production, and it has been the primary reason for failure of the adoption of thermoplastic types. Urea resins, in common with other thermosetting types, permit the release of pressure while the assembly is still hot, since they have been converted to an infusible form.

Although the phenolic resins provide a more durable bond the urea resins cure more rapidly at lower temperatures and in shorter periods of time. They can therefore be used to advantage where speed of production is important. Because of the faster cures and lower temperature, there is no tendency for case hardening in the top veneers. Furthermore, the ability of urea resins to set at room temperature is not equalled in straight phenolic resins, and this feature is important when heating facilities are limited. The lack of color in the urea resin itself is also an advantage for applications requiring a light colored veneer, particularly in cases where the edge of the veneer is exposed. Furthermore, the resins do not flow and penetrate as much as the phenolics, and there is no bleed-through of color when they are used for thin surface veneers.

One of the newer developments in urea-resin adhesives is a gap-filling cement which is effective for secondary or assembly gluing. Unlike the usual urea resins, this product is craze-resistant and can be used in thick glue lines where lack of adequate pressure or irregularity of shape of the contacting surfaces make it impossible to obtain thin glue lines.

## PAPER TREATMENT

Urea resin adhesives are also useful as modifiers for starch in paperboard lamination. The starch adhesives which have been used are not water-resistant, and delamination of the paperboard occurs upon weathering or immersion. The use of urea resin adhesives in combination with starch found extensive use during the war for the fabrication of paperboard used as containers by the armed services. These containers withstood vigorous treatment, such as being thrown overboard from ships to be floated into beaches with the tide.

Urea and melamine resins have many other uses in the treatment of paper and paper products. They can be used for tub sizing paper to increase the wet strength and to provide surface finishes on paper and paper products. However, the most important use is probably the beater application of melamine resins to provide greater wet strength and other improved properties.

The condensate used for this purpose is a slightly condensed methylolmelamine. Although other procedures may be used, the solution of the condensate is usually spray dried, and the product is obtained in the form of a fine powder. This form is desirable because it is more easily dispersed and dissolved in use. In order to prepare the resin solution for use,[56] the solid resin is added to aqueous hydrochloric acid with stirring. The amount of acid used is 0.7 to 0.8 mole per mole of resin as the monomer, and the amount of water used is such that a 12% solution of the resin is obtained. The solution is then allowed to age for at least three hours before use to develop the required colloidal properties. The solution remains stable and usable for about one week if the temperature is not allowed to exceed 100° F., and it can be kept for longer periods of time if it is diluted.

The resin solution is used in the regular paper making process, and no changes in the usual procedure are required.

### DRY STRENGTH TOO

A great deal of emphasis has been placed on the spectacular improvement in wet strength because of the increasing demand for this improvement. However, a marked increase in the dry tensile and bursting strength usually accompanies the wet strength improvement. This increase in the dry strength is sufficient to warrant the use of the resin for many papers in which wet strength is not required.

Fold endurance is also improved in nearly every case, and another improvement, which is not shown in these data, is that the linting tendency of the treated papers is almost entirely eliminated. This is particularly important for toweling, lens tissues, and facial tissues. The very marked increase in wet scuff resistance made evident is also accompanied by an improvement in the dry scuff resistance. This feature is particularly desirable in papers requiring good erasing qualities.

This description of paper resins has been limited to melamine resins. However, modified urea resins have been recently developed which are also effective for improving the wet and dry strength of paper. In general, these resins are not as effective as the melamine resin. Their retention on the fiber is not as good as that of the melamine resin, and a greater quantity of the urea resin is lost in the white water. Furthermore, the urea resins do not cure as well under the ordinary conditions of paper making. However, their use does give a marked improvement over the untreated, and because of their lower cost, increasing use is expected for applications which do not require maximum strength characteristics.

## LEATHER TREATMENT

Melamine resin intermediate used for the treatment of leather is similar to that used for paper treatment. The use of resins as synthetic tanning agents for leather is not new, but the nature of the materials which have been used is such that little or no change in molecular size occurs during or after the tanning process. A melamine resin intermediate, on the other hand, may be applied to the skin in substantially monomeric form and caused to cure in the leather.[58, 59] Although urea resins are similar to melamine resins in many respects, and although they have been considered for use as tanning materials, they have not attained commercial importance. The use of melamine resins for treating leather is relatively new, and although their use for this purpose was delayed by wartime requirements for melamine resins for other applications, there is now a rapid expansion in this direction, particularly for the production of white leathers. The melamine resin intermediate is substantially a methylolmelamine. It can be made by the procedures already described, but the commercial product is usually a spray-dried powder. The material is readily dissolved in water, by stirring it in water at room temperature. The solution of predetermined strength is then ready for charging to the drum, where it is applied to the skin.

Although many tanners prefer to use the resin in conjunction with other tanning materials, the use of the resin alone gives excellent results. If it is used alone, the amount generally required is about 10% of the weight of the stock.

The melamine resin intermediate has several features which recommend its use. The dry powder is stable on storage and solutions may be readily made for use. It readily penetrates into the skin, and resinification and cure occur at low temperatures in a short time. The resin is colorless, and the leather treated with the resin is white. Chrome tanned white leathers tend to have a bluish color. Al-

though the surface can be whitened by bleaching and treating with pigments, the interior remains dark, and the effect is impaired when the surface is scuffed sufficiently to expose a lower layer. On the other hand, leathers treated with melamine resin are white all the way through, and they do not darken with age or exposure to sunlight. They are highly resistant to heat and oxidation while possessing improved fullness, texture, and wearing qualities.

## TEXTILE TREATMENT

The treatment of textile fabrics,[60] such as wool,[14, 61, 62, 63] rayon, and cotton,[64, 65, 66] requires a water soluble resin to provide shrinkage control and crease resistance, to minimize or eliminate dye bleeding in non-fast colors, to make glazed chintzes durable to laundering, and to act as a mordant for dyeing cellulosic fabrics with wool dyes.

Both urea and melamine resins are used for these purposes. The type of treatment is quite similar to that used for leather. The resin intermediate must be essentially monomeric to insure good penetration into the fibers, and it must be water soluble. In the urea type, either a material which is essentially a methylolurea or a partially condensed form may be used, although the former is to be preferred for most applications. These materials may be made by procedures which have already been described, and the amount of formaldehyde in the material may be varied. For best results, however, the molar ratio of formaldehyde to urea is usually less than 1.5 to 1.0.

The melamine resin intermediate may also be a methylol derivative, and the material generally used has two or three moles of combined formaldehyde. The tray-dried methylolmelamines are not appreciably water soluble. The maximum cold water solubility of these materials is in the range of 5%, and in most cases it is desirable that the concentration of the solution used for the impregnation of textiles be in the range of 8 to 10%. The tray-dried material may be used in this concentration range if solution is effected by heating. No precipitation occurs upon cooling, but the bath life is materially reduced by the heat treatment, particularly when the catalyst is present, and the development of formaldehyde odors is also objectionable. On the other hand, the spray dried methylolamine may be dissolved by simply stirring it into cold water.

The third type of material, which offers further advantages, is the alkylated products, specifically the methyl ethers of the methylolmelamines. The resin intermediate ordinarily used is substantially the trimethyl ether of trimethylolmelamine. It is usually supplied as an 80% solution, and it is infinitely dilutable with water. Whereas the methylolmelamines have somewhat limited stability upon storage, this product has excellent stability if kept cool. No discernible change has been observed when samples of this material have been stored for as long as three years. This product also has a longer bath life in the presence of catalysts.

The choice of resin intermediate depends upon the type of fabric to be treated and the properties desired on the treated fabric. In general, they are all used in the same manner. The impregnating bath consists of a solution of the resin intermediate to which a catalyst is added to accelerate the cure of the resin. The catalysts are generally proprietary, and they consist of acid salts which are preferably buffered to give maximum bath stability and optimum pH in the bath.

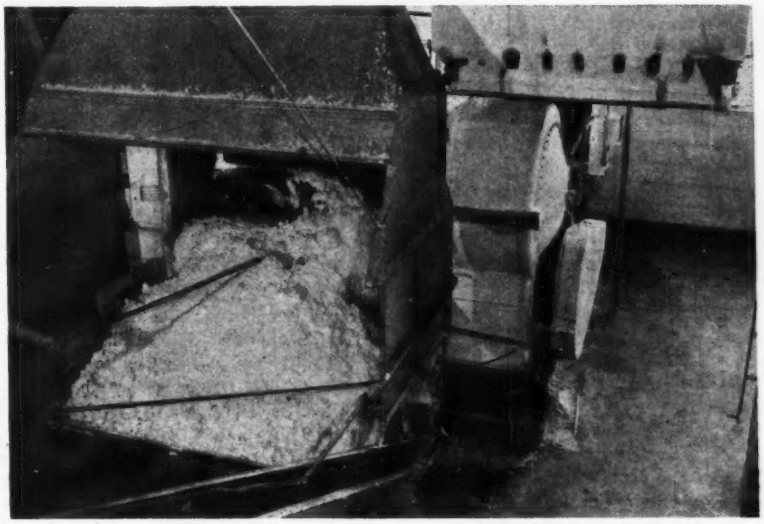
The solution can be applied by means of conventional two or three bowl pad mangles, and heavy pad pressures giving 50-75% wet pickups are considered desirable to obtain the best penetration and optimum results. The goods are dried under tension and then cured.

### WOOL TREATMENT

The most spectacular results of the resin treatment are those obtained with wool. Although wool has inherently good crease resistance and many people consider it to be an ideal fiber, wool fabrics shrink badly and show pronounced tendencies to felt. While urea resins are not quite so effective, woolens treated with melamine resins have outstanding resistance to shrinkage during normal laundering, and the tensile strength of the fabric is not materially affected.

While the shrinkage of some woolen fabrics is difficult to control, the control obtained with many fabrics allows them to be laundered instead of dry cleaned. This feature is particularly desirable for the removal of perspiration and other water soluble stains which are not removed by the usual dry cleaning methods. In addition to the shrinkage control which the resin treatment provides, there are also improvements in other properties. The finish is permanent for the life of the goods, and the treated fabrics show no signs of "pilling" or fuzzing. Dye fastness is also improved, and the treated wool has better resistance to alkali than the untreated material.

Cotton fabrics have the least inherent shrinkage, and their shrinkage can be minimized by the Sanforizing process. This is a mechanical operation which gives artificial pre-shrinkage, but its use results in about a 7% loss of yardage. Shrinkage can also be minimized by treatment with urea and melamine resins, and the loss of yardage is reduced to 2-3%. In the past, the tensile strength of the fabric was reduced by about 25% by the treatment. However, the loss caused by melamine resins can be eliminated by the use of special modifiers which have been recently developed.



Urea-formaldehyde molding powders contain a cellulose filler. After the resin and alpha-celluose paper stock have been blended, the mixture is conveyed to large drying ovens.

Cotton treated with either urea or melamine resin must be given an anti-chlorine treatment if it is to be bleached. The lack of an efficient anti-chlorine treatment often results in a serious loss of tensile strength for fabrics treated with urea resins, and in the development of a yellow color for those treated with melamine resins. Because of these restrictions, the resins have had only limited use for the treatment of cotton. The new modifiers of the melamine resins are expected to change this situation, and expanded usage of melamine resins on cotton is foreseen.

The resins have been used to a much larger extent for the treatment of rayon,

which is not normally bleached. In general, rayon has better crease resistance than cotton, but it shrinks to a much greater extent. The resin treatment is used both to improve the crease resistance and to reduce the shrinkage.

In addition to the use of the resins for the production of durable glazes on chintz already mentioned, they are also used as binders for finishes applied to lace and net goods to improve the crispness, to prevent thread slippage, and to provide shrinkage control.

## SURFACE COATINGS

Surface coating applications constitute a very important use for urea and melamine resins, but the type of resin required differs from those already discussed in other applications.

The types of urea and melamine resins which have been discussed are brittle in thin films, and they have poor adhesion on hydrophobic surfaces. It is for these reasons that the early urea resins were not adopted, and it was not until modified types had been developed that their use became of importance in surface coating applications.[67, 68, 69, 70, 71, 72, 73, 74] These modified resins consist of various alkylated types. In other words, the urea-formaldehyde and melamine-formaldehyde condensates are condensed with alcohols, and the alcohol used to the greatest extent for this purpose is butanol. These modified resins are compatible with alkyd resins and many other materials, so that they can be plasticized to provide excellent properties in surface finishes.

The resins may be made in several ways. In one process, the urea or melamine, formaldehyde, and butanol are charged to the kettle and heated to reflux. The amount of formaldehyde used is generally larger than that used in the production of urea and melamine resins for other uses. Because resin formation occurs in this process along with ether formation, the use of low ratios of formaldehyde leads to the formation of gelled products. The amount of formaldehyde used for the production of a satisfactory resin is therefore in the range of 4 to 6 moles per mole of melamine and 2 to 3 moles per mole of urea. Depending upon the acidity of the formalin and upon the type of resin to be made, an acid catalyst may or may not be used in the process. Less acid is required for melamine resins than for urea resins, and the amount used in either case governs the degree of alkylation in the final product. The more highly alkylated products have a wider range of compatibility with other resins, and the products with a lower degree of alkylation have faster cures.

Alternatively, the urea or melamine may be precondensed with formaldehyde to produce methylol derivatives or partially resinified products as we have already discussed. The effect of using these materials here is that a part of the water is removed before the product is alkylated. This produces some changes in the system, and the conditions must be modified to compensate for them. Both resin formation and alkylation occur during the reflux period. Longer reflux periods tend to yield more viscous products, and in some cases, the reflux period may be dispensed with altogether. In such cases, dehydration is started as soon as the reflux temperature is reached.

The dehydration operation consists of azeotropic distillation of water from the reaction mixture. The distillation may be carried out either at atmospheric pressure or under reduced pressure. Ordinarily the first stage is effected at atmospheric pressure because the distillation temperature is low. Then as the boiling point rises as the reaction mixture becomes poorer in water, reduced pressure is applied. This maintains a low distillation temperature and prevents excessive resin formation. In order to retain a sufficient quantity of solvent in the kettle, butanol may be added continuously at the same rate that the distillate is collected. Another method consists in collecting the distillate in a trap which returns the butanol to the kettle and from which the water may be drained. Xylene or other solvents may be added to the system to aid in the separation.

After the water has been removed, the resin solution is concentrated by distillation and the resin content is determined. The solution is then cut back with solvents to give a proper working viscosity. Xylene, butanol, or other solvents may be used for this purpose, and the final product has a resin content in the range of 50-60%.

### IMPROVES ALKYDS

The properties[71, 72, 73, 74, 75, 76, 77] of the alkylated urea and melamine resins recommend their use in baked coatings for a very wide variety of applications. Although the resins have poor adhesion and toughness over most surfaces, excellent finishes are obtained by using them in combination with alkyd resins.[78] The amount of resin used in such combinations depends upon the properties desired in the finish. As little as 10% may be used in some cases, and 50% or more may be used in others. The alkyd resin imparts qualities of adhesion, toughness, flexibility, and durability, and the urea and melamine resins provide qualities of fast cure, hardness, color, and resistance to heat, abrasion, water, and chemicals.

Urea resins flow readily and show good leveling, and they can be used in ordinary equipment without special handling. Combinations of alkyd resins with urea resins cure rapidly, the usual baking schedules being in the range of one hour at 120° C. to 20 minutes at 150° C. The hardness of the finish is a function of the cure and of the amount of modifier. Because the urea resins are very hard in themselves, hard, permanent finishes can be obtained from their combinations with alkyd resins. Such finishes also have a high degree of mar resistance which is not obtainable with unmodified alkyd resins.

It has already been noted in connection with other applications that urea resins are colorless, and that they have excellent color retention. This feature is retained in their combination with alkyd resins, although the type of modifier has an effect. While light colored non-oxidizng alkyd resins can be made which do not discolor appreciably upon heating or aging, the oxidizing types do not have good color retention. Good color and color retention can be obtained at temperatures up to 150° C. from urea resins modified with non-oxidizing alkyd resins.

There are many factors affecting gloss. Increasing time and temperature of baking tends to decrease the gloss of all organic finishing materials. However, because of the rapid cure of these materials, the effect of this factor is decreased, and good gloss is retained at temperatures up to 150° C. with urea-alkyd combinations. The flexibility, toughness, and adhesion of the finish depends upon the amount of modifier. By the use of proper quantities of materials, it is possible to obtain hard, mar resistant finishes which also have good flexibility, toughness, and adhesion. The good water and chemical resistance of the alkylated urea resins is also evident in these combinations. Furthermore, urea resins have no adverse effects upon their durability.

The properties of the combinations of alkyd resins with melamine resins are equal in every respect to those with urea resins, and they show definite advantages in nearly all properties.

The combination of properties which can be obtained from these materials recommend their use in clear films and in enamels for many purposes. Representative uses include refrigerator and washing machine enamels and automotive finishes.

## ION EXCHANGE RESINS

Among other applications for urea and melamine resins is their use in the preparation of ion exchange resins. The properties sought in this type are the chemical, rather than the physical properties of the resin.

There are two types of exchange resins; cation-exchange resins and anion-exchange resins. Either urea or melamine can be used for preparing these resins, but the melamine resins are preferred because of their better stability and chemical resist-

*(Turn to page 320)*

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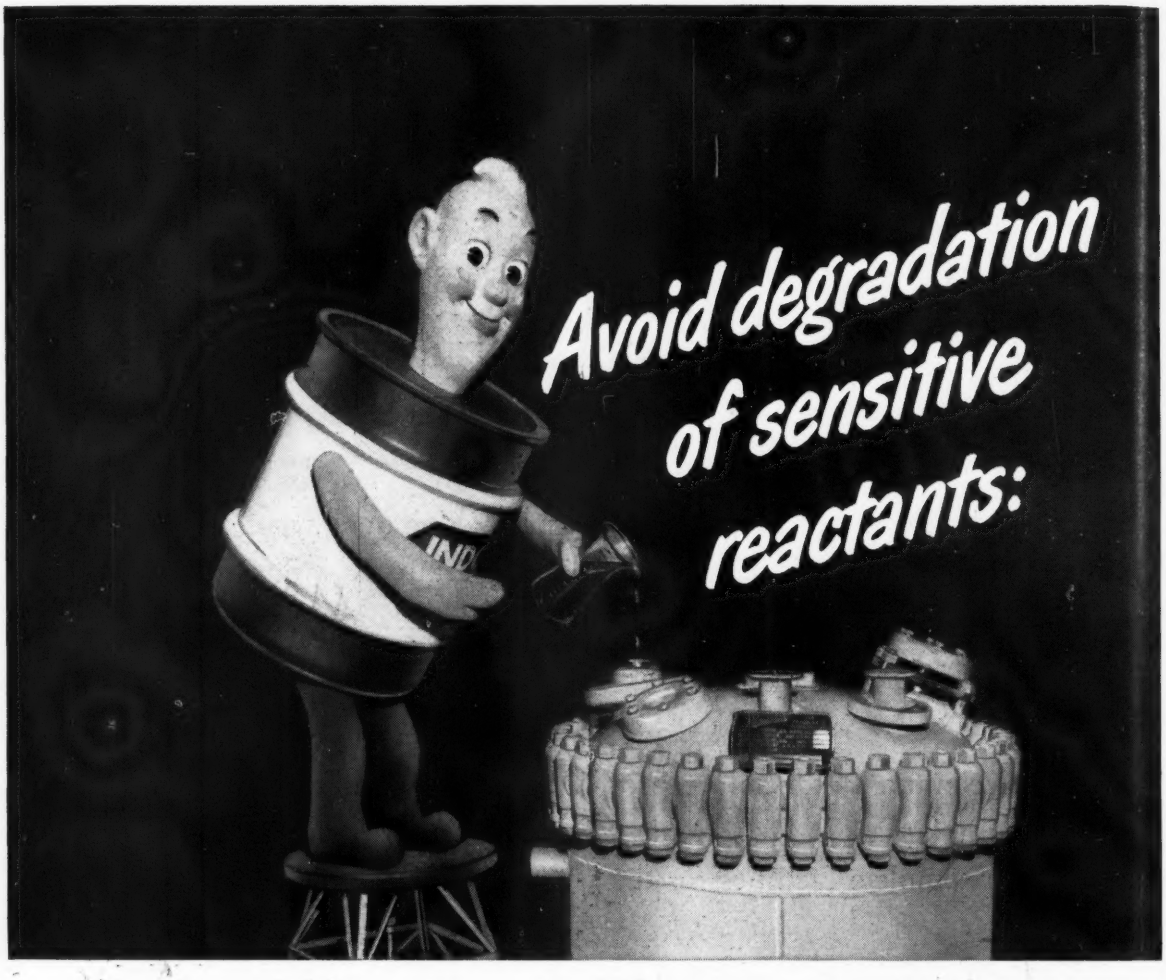


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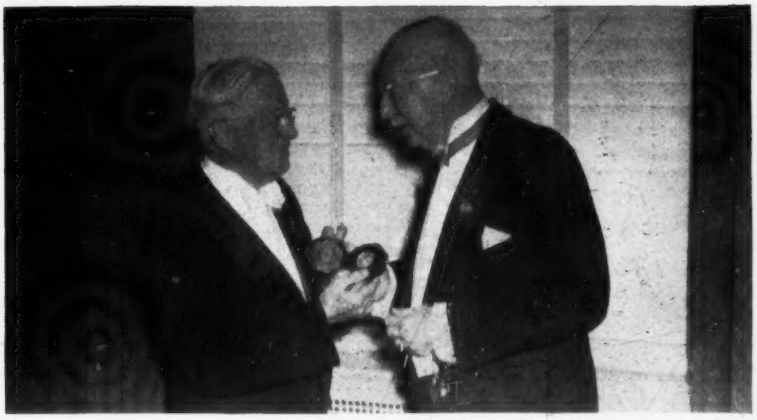
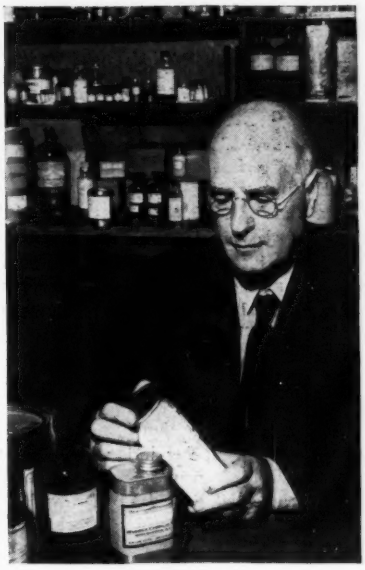
# THE CHEMICAL PANORAMA

NEWS OF THE CHEMICAL PROCESS INDUSTRIES IN PICTURES

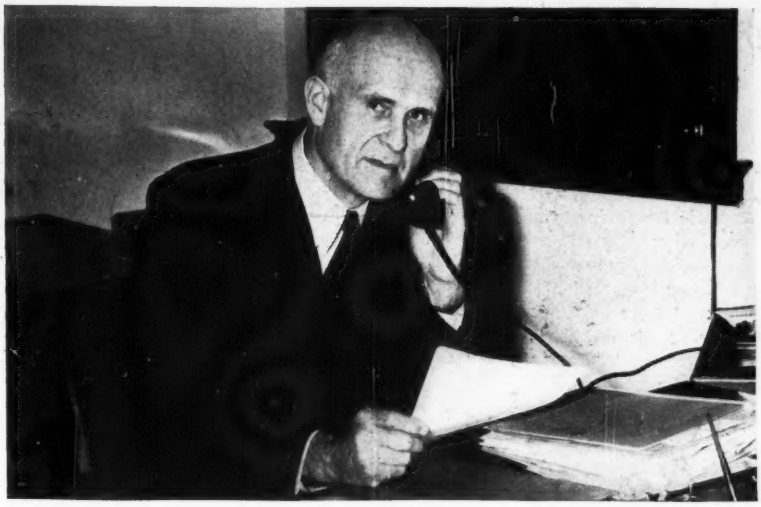
## PEOPLE



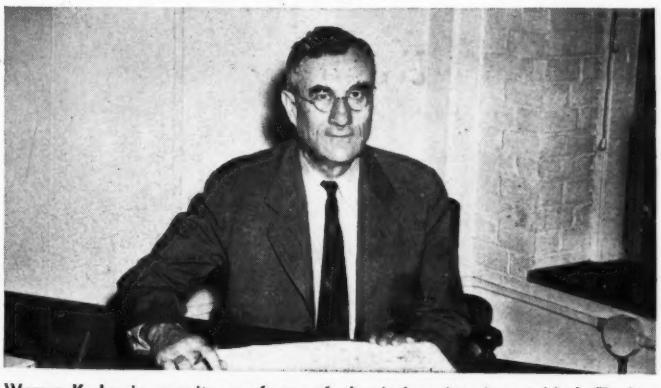
Carl S. Miner, founder and director of Miner Laboratories, receiving the 1949 Perkin Medal from Marston Bogert. It was awarded to him for his part in the development of furfural.



James W. McBain, Stanford U., named director of the National Chemical Laboratories, India. He will leave for India this month.



Per K. Frolich, who has been appointed vice president for research and development, Merck & Co. He joined the company in 1946 and has been director of research and development.



Warren K. Lewis, emeritus professor of chemical engineering at M. I. T., has been selected to receive the 1949 gold medal of the American Institute of Chemists. Presentation will be made at the Institute's annual meeting in May.

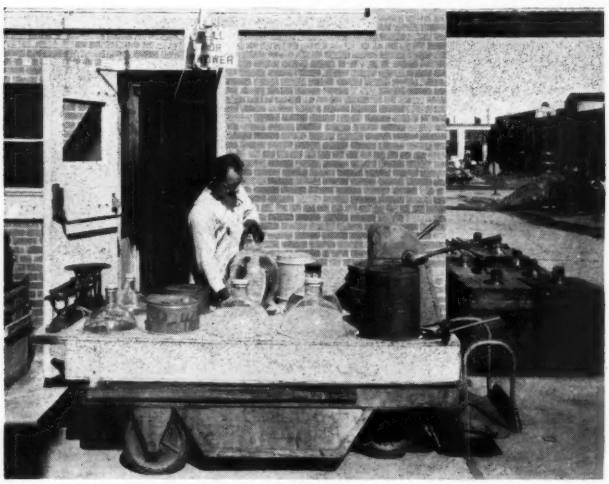
William T. Nichols, formerly with the Westvaco Chemical Division, has been named director, general engineering department, Monsanto Chemical Co.

Members of the supervisory staff of Eastman's Synthetic Organic Chemicals department hold regular conferences in chemistry library.

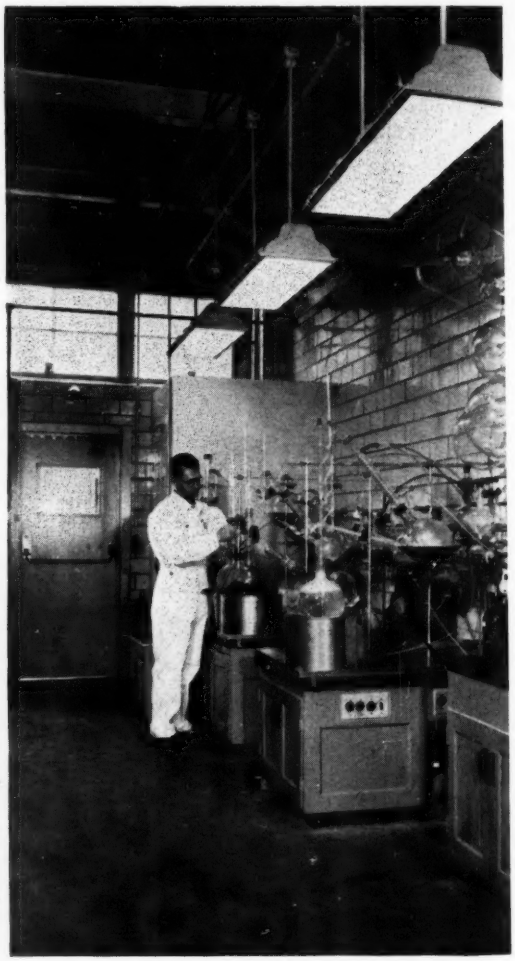
# Lab Chemicals Production

Eastman Kodak Co.'s new synthetic organic chemicals laboratory (*see CI, Jan. 1949, p. 64*) has several special features. The nine unit laboratories are long and narrow, 38 feet by 15 feet, designed to save steps and facilitate operations. The tile in the labs is acid-proof, and the walls have special mortar joints which permit them to be washed down with solvents or strong acids without deterioration or stain. There are also wire-glass safety enclosures which permit chemists to stand protected by glass shields while controlling syntheses. Walk-in type hoods offer increased ventilation.

Eastman anticipates that the new plant will not only increase its production capacity, but also will enable it to experiment with the syntheses of new chemicals which have not previously been available. At present, Eastman stocks 3,000 chemicals—compounds which are not commercially available, but which are required for laboratory purposes. It also purifies technical grade materials obtained from other manufacturers.



Stock clerk loads starting chemicals, which have been ordered by one of the company's chemists to make an assigned preparation, onto a truck.



Apparatus for distillation is set up. After purification, product is weighed prior to delivery to the testing laboratory.

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**Liquid, solid and gaseous samples** may be analyzed.

**Monochromatic light beam** is easily brought outside the instrument for long path measurements and special uses.

**Accommodates large cells** up to 50 m. m. path length in standard cell carrier.

**Interchangeable photocells**—red or blue-sensitive to utilize the high resolving power of the Model "B".

**Easily-attached Model "B" accessories** will be available for special types of measurements and for added convenience and accuracy. Write for details.

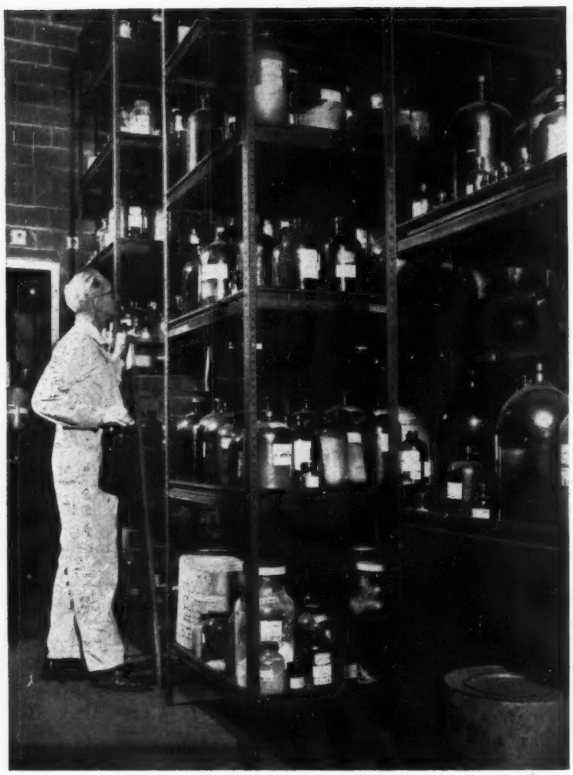
The new Model "B" Spectrophotometer is by far the outstanding routine instrument available. It provides advancements pioneered in the Beckman Quartz and Infrared Spectrophotometers but never before offered in a low priced instrument. These advantages are important because they combine simplicity, convenience and versatility without sacrificing accuracy and reliability.

*The Model "B" has better ultraviolet performance ... better resolution ... better wavelength and photometric accuracy ... and more freedom from stray light than any other instrument in its field.*

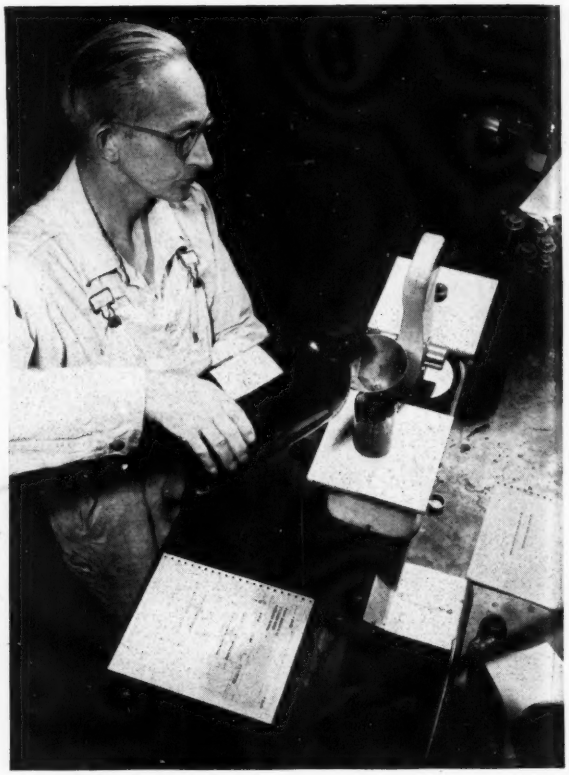
A descriptive bulletin on the Beckman Model "B" Spectrophotometer will gladly be sent on request. Write today. *Beckman Instruments, National Technical Laboratories, South Pasadena 17, California.*

BECKMAN **INSTRUMENTS CONTROL MODERN INDUSTRIES**

**pH Meters and Electrodes—Spectrophotometers—Radiation Meters—Special Analytical Instruments**



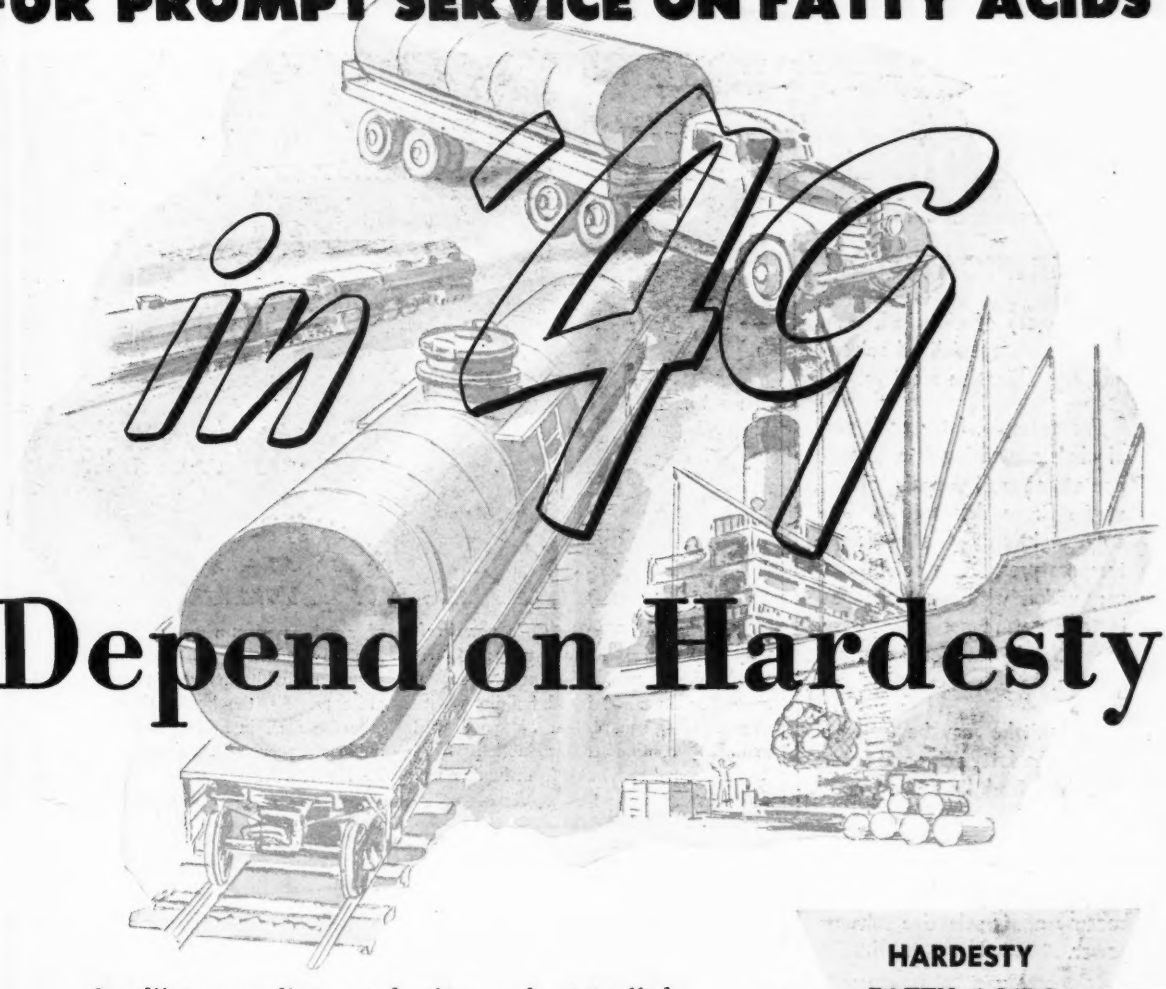
Chemical is placed on the stockroom shelves after testing by lab technicians. Stockroom contains more than 3,000 organic chemicals.



Stock clerk filling an order carefully pours chemical into a container. A perpetual inventory of all chemicals in stock is maintained.

Central corridor, which contains signal devices and equipment. The nine long and narrow laboratories open off this corridor.

# FOR PROMPT SERVICE ON FATTY ACIDS



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Steadily expanding production and controlled schedule shipping assure Hardesty customers of a dependable source of supply for fatty acids and their derivatives.

Hardesty Fatty Acids are rigidly processed products that insure consistently uniform results in your end production process. You're missing plenty if you've never used Hardesty Fatty Acids for your products.

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**For example, fatty acids and alcohols containing 8 to 18 carbon atoms are infinitely soluble at 60°C. in Acetonitrile, but only slightly soluble at lower temperatures. The solubilities vary widely with slight changes in temperature permitting easy separation by fractional crystallization.**

**Acetonitrile may be used to extract the fatty acids and other impurities from linseed oil, cotton-seed oil and other fatty oils.**

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**Acetonitrile is a stable, clear, colorless liquid with an aromatic odor.**

**Boiling Range . . . 80-82°C.**

**Purity . . . . . 99% Min.**

**Specific Gravity at 20°C. 0.782-0.785**

*For further information write to:*

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**CHEMICALS DIVISION**

**UNITED STATES VANADIUM CORPORATION**

*Unit of Union Carbide and Carbon Corporation*

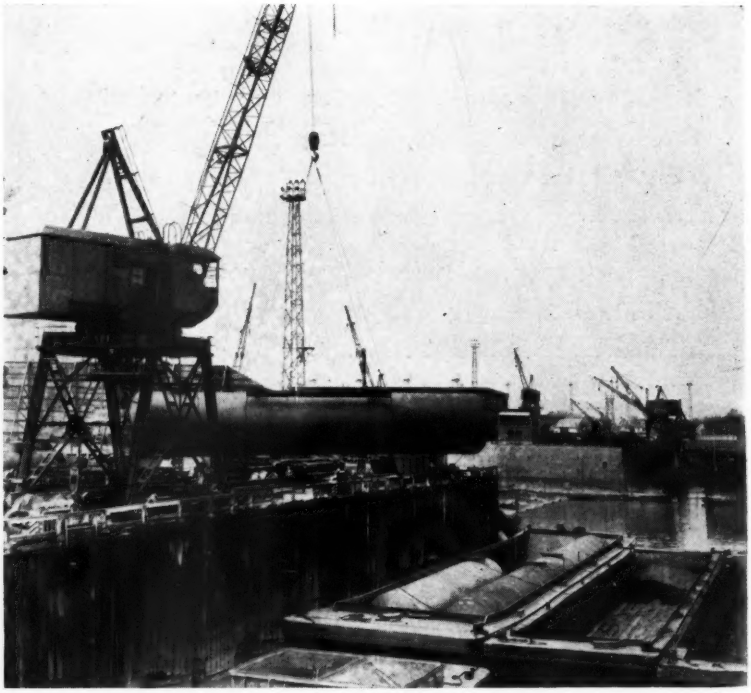
*Sales Offices*

**922 Niagara Bldg. ● Niagara Falls, N. Y.**


## Kraft Pulping

Weyerhaeuser Timber Co.'s new kraft pulp mill is now in operation at Longview, Washington. Advanced precision apparatus, installed in 12 buildings with over 200,000 square feet of space, will maintain continuous production from "bonus" wood recovered from lumber and plywood manufacturing on the same plant site. In addition to western hemlock, spruce and white fir used in the older sulphite process, the kraft mill will utilize other species, including Douglas fir, an important species on the tree farms in the Pacific Northwest.

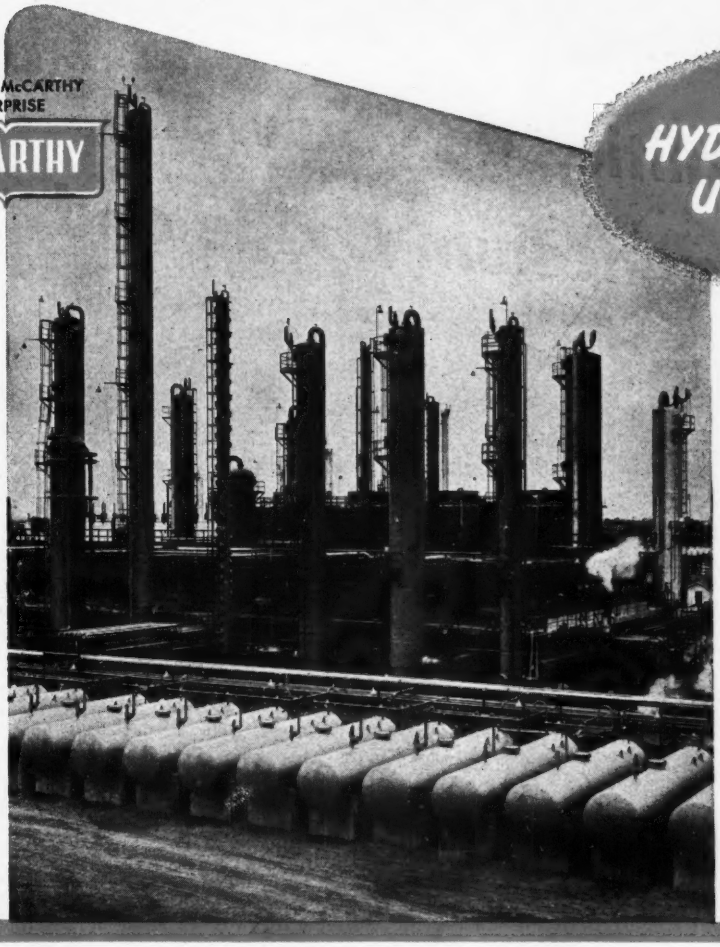
## Transport For Hydrochloric



The first of five barges especially designed for carrying hydrochloric acid has been completed by the Dravo Corp. for the Dow Chemical Co. Each barge carries four 58,400 gallon rubber-lined tanks, the largest ever built for river barges.

A GLENN McCARTHY ENTERPRISE

McCARTHY



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NOW AVAILABLE

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**Methanol**
**Acetaldehyde**

McCARTHY CHEMICAL COMPANY
WINNIE, TEXAS

**At Winnie, Texas, in the heart of the great natural-gas fields of the Gulf Coast, McCarthy Chemical Company is now producing vital organic chemicals in unlimited quantities to supply the ever-increasing demands of industry.**

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McCarthy Chemical Company completes the "production line" of raw materials from gas well to ultimate industrial user, all under the McCarthy shield — an accomplishment in gathering and processing that assures a stable and continuous flow of these needed chemicals from large basic reserves.

McCarthy-owned and operated facilities gather and deliver the natural gas; separate and process the hydrocarbons, and transport petro-chemicals to market in a fleet of specially-constructed tank cars.

## Hydrocarbons Unlimited

Developments by the McCarthy companies today are sending more vital chemicals to market—and more, are making significant strides in the conservation of natural resources — converting yesterday's wastes into valuable petroleum and chemical raw materials through continuing research.

## Prompt Delivery

**in Commercial Quantities**

- **Inhibited 37% Formaldehyde**
- **Uninhibited 37% Formaldehyde**
- **Methanol**
- **Acetaldehyde**

**McCARTHY CHEMICAL COMPANY**

G. M. McGRANAHAN, *Vice-President and General Manager*

SHELL BUILDING — HOUSTON, TEXAS TELETYPE HO-181 — PHONE: PRESTON 7204

# What qualities do you want in your Magnesium Oxide and Carbonate?

How many of these qualities are vitally important to you? You get all seven—when you buy Baker's Magnesium Oxide and Carbonate.

If you react Magnesium Oxide or Magnesium Carbonate chemically, or if your final product must meet predetermined specifications, you will be interested in Baker's measured purity typified by the low iron and calcium content of these two fine chemicals.

If you formulate either of these compounds into dry or wet mixtures, the controlled particle size and density will enable you to achieve a uniform final product. This helps to simplify both your manufacturing and packaging problems.

Baker's protective packaging assures you that these chemicals will arrive at your point of use in good condition. Long experience in cooperating with users of Baker's Magnesium Oxide and Carbonate indicates that all seven of Baker's features are both important and essential.

So write for free testing samples and make your comparison. We will gladly quote prices. Address: J. T. Baker Chemical Co., *Executive Offices*, Phillipsburg, New Jersey.

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**Baker's Chemicals**

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# River Comes To Chemcel

Editorial Staff Report

**CELANESE CORP. went twenty-five miles, licked tough corrosion problems for its Chemcel process water.**

TWO HUNDRED thousand gallons a minute is a lot of water, but that is what Celanese Corp. needed to operate its huge Chemcel, Texas plant (*CI, May '48, p. 738*). Final plant design called for reuse of 196,000 gallons, which meant that 4,000 gallons of make-up water a minute had to be found.

Originally, engineers planned to sink two types of well on the plant site even though they knew that the water under the plant was extremely hard (mineral content 1,330 p.p.m.). One group of wells was to provide the needed process water, and the other, potable water. Then something upset these plans.

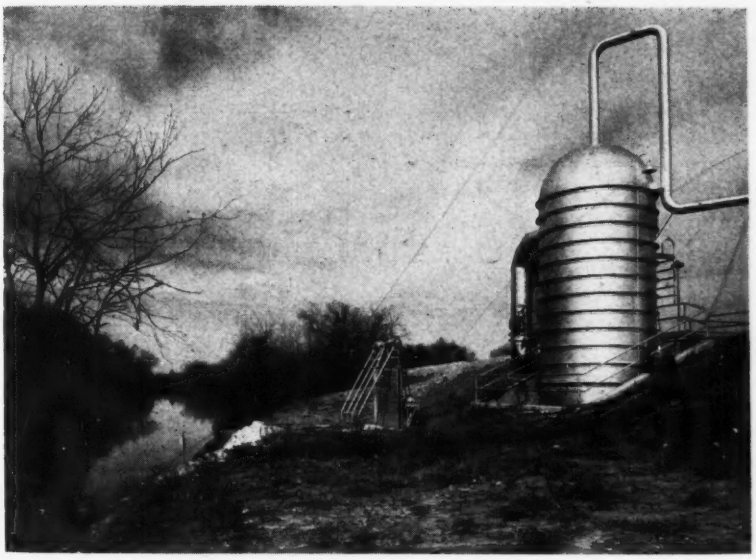
### WATER TABLE DROPS

As has happened in many parts of the country, this huge demand, coupled with an increasing drain on local water supply for irrigation purposes, rapidly lowered the water table. Potability of the municipal water supplies of nearby Kingsville and Bishop was endangered by salt water encroachment. Acting on the advice of geologists, the company sought another source, ending up at the Nueces River 25 miles away.

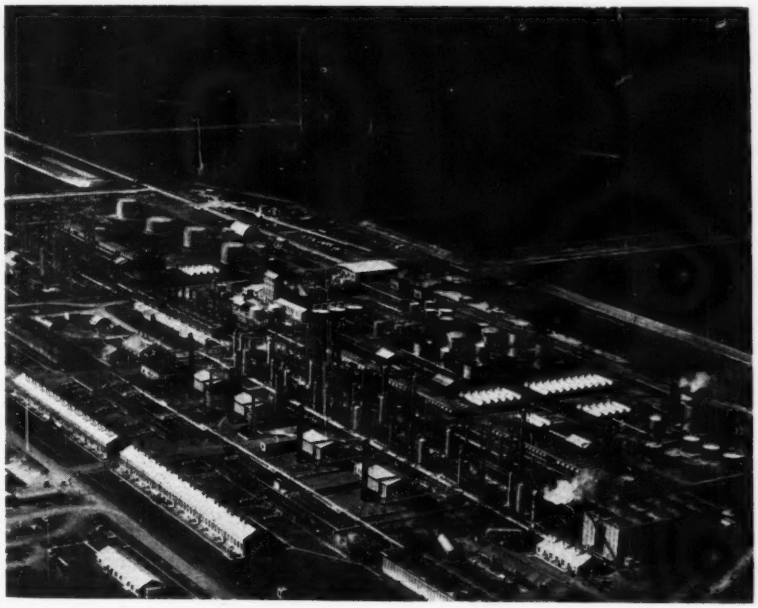
To supply the needed water and still have an adequate reserve against further expansion, a 22″ pipeline was installed. At this point the specter of corrosion raised its ugly head. (The company could not get cast iron pipe at that time and had to settle for mild steel, which is more readily attacked.) As first steps in retarding corrosion, the pipe was wrapped and doped on the outside, and seventeen magnesium anodes were installed for cathodic protection. But as the primary offender was oxygen dissolved in the water, more elaborate precautions were necessary.

Celanese decided to remove the oxygen from the water before sending it on its twenty-five mile trip. Now 95% of the dissolved oxygen is removed by deaeration before entering the pumps.

Reciprocating two-stage vacuum pumps maintain a vacuum of 28″ Hg on the deaerator (large vessel in the picture at top of page). This vessel, 20′ high and 12′ in diameter, is packed with wooden slats. All operations at this end of the pipeline are completely automatic, requiring only an occasional maintenance checkup. However, test spools which are maintained in the pipeline, are checked periodically for corrosion. To guard against breakdown, a seven-day reserve supply of water is held at the plant in ponds (back of lower illustration).



**Four thousand gallons of process water per minute from the Nueces River is passed through this vacuum deaerator before it is pumped 25 miles to Celanese Corp.'s Chemcel plant below.**



### BOILER WATER

Despite this highly satisfactory water supply system, the company still needs well water for one process use—a portion of its boiler water. (Plant boilers produce about a million pounds of steam per hour since steam turbines drive all process pumps.) Although the river water normally has a much lower mineral content than the well water, this is a permanent hardness which can be removed by a combined treatment with acid and lime.

Fortunately, the extremely high mineral content of the well water contains a large excess of sodium bicarbonate, and it was found that a combination of well and river water—no other chemicals are added—gives suitable boiler feedwater. Only one control is required: analysis of river water at intervals to determine the mixture needed. The mineral content of the river water varies with the amount of rainfall, but the well water always remains the same. Properly combining the two completes the solution to Chemcel's water problems.

# 1948 Legal Decisions Hold Lessons For Chemical Makers and Sellers

by LEO T. PARKER, Attorney at Law
Cincinnati, Ohio

**OWNERSHIP OF INVENTION . . . liability for personal injury . . . dealer responsibility . . . breach of contract . . . misleading advertising. Here are points of law that determined significant decisions on these subjects in 1948.**

DURING the year 1948 a number of important decisions were handed down by the higher courts involving chemical manufacturers, distributors and sellers. In this article we shall review several which involve significant and informative points of modern law and which may help readers avoid losses through litigations.

### Partner is Injured.

According to a recent higher court an injured partner in a chemical business cannot recover compensation under State Workmen's Compensation Act.

For illustration, in Wilhelm v. Industrial Commission, 77 N. E. (2d) 174, the testimony showed facts as follows: One Wilhelm was seriously injured when he was engaged in research work in scientific fields for the Medical Products Company which manufactured pharmaceutical preparations.

Wilhelm sued for compensation under the State Workmen's Compensation Act, but the higher court refused to award compensation because the testimony showed that he was a partner in the business. The court said:

"It is our considered opinion that proof that the relationship of employer and employe existed at the time of the accident is one of the essential elements of an award under the Workmen's Compensation Act. To establish this relation, one must be in the service of another under a contract of hire, express or implied."

### No Corruption.

Modern higher courts consistently hold that it is perfectly legal for a company to employ a representative to obtain new business from the United States Government.

For illustration, in Hildebrandt v. National Solvents Corporation, 59 Atl. (2d) 45, the testimony showed facts as follows: The National Solvents Corporation hired an employe named Hildebrandt under a written contract to procure contracts from the government and to act as the Washington representative of the company.

In subsequent litigation it was contended that such a contract was invalid because it was corrupt and against public policy because they contemplated obtaining contracts or awards from the government by influence and persuasion. The higher court refused to agree, saying:

"The testimony reveals no evidence from which it could reasonably be inferred that the services to be performed were of such a nature as to permit an inference that they might tend to influence improperly any agency of the government or that the services had an inherent tendency to invite or promote the use of sinister or corrupt means to accomplish the end sought."

### Liable for Negligence.

All contracts exempting a person from liability for consequences of his negligence are void.

In Nashua Paper Company v. Noyes Buick Company, 41 Atl. (2d) 920, the testimony showed that a company leased a storage space. The contract contained a clause that the company would not hold the building owner liable for loss or damage to its merchandise caused by fire.

The building owner's employe while using an acetylene torch permitted sparks to drop on combustible materials starting a fire which destroyed the building and the company's stock of wax, glue, chromic acid, etc., valued at $75,000.

The question presented the court was whether the above clause in the lease contract relieved the building owner from $75,000 liability to the lessee company. In holding in the negative, the higher court said:

"The ordinary contract exempting a person from liability for the consequences of his negligence is held to be void, as against public policy."

### Advertisements False.

According to a recent higher court chemicals and drugs falsely branded, labeled, or advertised may be confiscated by the government.

In Research Laboratories, Inc. v. United States, 167 Fed. (2d) 410, it was shown that a company is engaged in the manufacture, sale, and distribution of proprietary drug and chemical products. The company's direct sales program involves extensive use of advertisements in daily and weekly newspapers and similar publications. The government agents seized 600 cases of the product, and proved that there appeared in newspapers false advertisement of its curative qualities.

The higher court approved confiscation of the drug although the false statements were not part of the labeling. The court said:

"The jury has determined that it hasn't any value for that purpose, so it would be inconsistent, it seems to me, for me to hold that it should be preserved and released to the claimant."

### Subsidiary Must Pay Taxes.

According to a recent higher court, subsidiary of a parent corporation must pay taxes on *all* of its income.

In Internal Revenue v. National Carbide Corporation, 167 Fed. (2d) 304, it

ORONITE CHEMICAL COMPANY

REG. U. S. PAT. OFF.

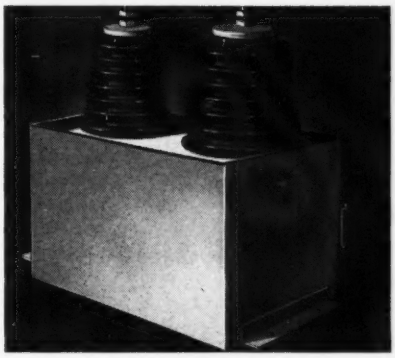
THE NAME TO WATCH IN CHEMICALS

# IMPROVE ELECTRICAL INSULATION WITH ORONITE POLYBUTENES

**These hydrocarbon polymers** are especially important where electrical insulation material must withstand high operating temperatures. The high dielectric strength, low power factor and stability of Oronite Polybutenes make them extremely useful in this field.

Polybutenes are available in eight grades of viscosity to meet specialized conditions. They can be mixed with many elastomers, resins, asphalts, pigments and adhesives.

If your product calls for moisture resistance, tackiness, flexibility, bodying or non-drying properties, it may pay you to get the facts on Oronite Polybutenes.



**Improved insulation of electronic capacitators** is a typical example of the manufacturing advantages offered by Oronite Polybutenes. The addition of this outstanding product helps reduce breakdowns due to atmospheric oxidation, humidity, voltage fluctuations and elevated operating temperatures. Here again, the high dielectric strength, stability, low power factor, high viscosity and flexibility of Oronite Polybutenes prove of vital importance in the field of electrical insulation.

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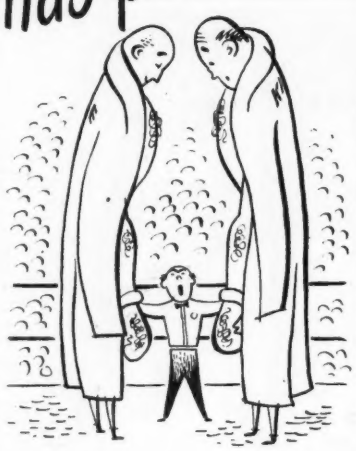
Everyone has problems



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V2


## LEGAL DECISIONS (Continued from page 242)

was shown that a parent corporation organized subsidiary corporations for manufacture and sale of chemical products.. The parent corporation furnished assets for the subsidiaries, managed operations of the subsidiaries, and took all profits of the subsidiaries above **6%.**

The higher court held that *all* profits of the subsidiaries were taxable against the subsidiaries rather than merely six per cent of the profits which the subsidiaries retained.

### Ultra-Hazardous Business.

Recently, a higher court rendered a very unusual decision holding that a person who carries on ultra-hazardous business is liable to another who suffers injury although *utmost care* is exercised to prevent harm. This decision is unusual because previous higher courts generally established present law that a person who uses "ordinary care" to prevent injuries to another is not liable.

For example, in Luthringer v. Moore, 190 Pac. (2d) 1, the testimony showed facts, as follows: The owner of an office building employed a man named Moore to exterminate cockroaches and other vermin in the basement. He made his preparations and released hydrocyanic acid gas in the basement about midnight. An employe in the building arrived about 8:45 a.m. Feeling ill, he lost consciousness. The employe was treated by the firemen with a resuscitator and taken to the hospital where he received medical attention. He was found suffering from hydrocyanic acid gas poisoning.

Although Moore used utmost care to seal all cracks to prevent escape of the gas from the basement the lower court awarded the employe $10,000 damages.

### Dealers Liable.

According to a recent higher court a manufacturer, his distributor and retail dealers are liable for selling damaging chemicals.

In Ahrens v. Moore, 178 S. W. (2d) 256, reported May, it was shown that a distributor purchased anti-freeze which was represented to him by the manufacturer as a new formula. The anti-freeze was received by the distributor in carload lots. He distributed the product in the original sealed containers to various purchasers.

In a remarkably short time after being put in the radiators, the anti-freeze disabled the cars. Witnesses testified as to various damages: The anti-freeze solidified rather than remained liquid; it corroded radiators, destroyed rubber hose connections, ate out the gaskets, got in the working parts of the cars, ruined the ignition; and otherwise damaged the cars.

Numerous users filed suit against the distributor and retail dealers to recover damages. In holding the latter fully liable, the higher court said:

"Where a dealer purchases and sells a new and experimental product not in general use . . . such dealer cannot claim immunity from liability for damages that follow such use."

Quite obviously the distributor and dealers can sue and recover damages from the manufacturer.

For comparison, see Graham v. March Company, 67 N. E. (2d) 404. Here it was shown that a woman purchased a jar of cold cream which contained this legend: "Velvet of Roses, Dry Skin Cream is recommended in cases of prolonged dryness or undue exposure. Used regularly it helps give the skin a smooth, soft, pliant appearance. Apply at night. Smooth over face and throat and pat well."

That evening she applied the cream to her face, permitting it to remain on her face for an hour and a half, when her face became red, burned and swollen. The next morning her eyes were swollen and almost closed. She applied the cream the next evening with similar results. The next day she notified the druggist that her face had been burned by the cream. She then saw a physician who treated her.

In subsequent litigation the physician testified that her condition was an "allergic dermatitis, some sensitivity to something that she came in contact with."

The higher court refused to allow the woman any damages, saying:

"The burden was upon the plaintiff (Graham) to prove that the cream was unfit for use by a *normal* person. She could not prevail by showing that it was merely unfit for use by one who was constitutionally unable to use cold cream because of a supersensitive skin."

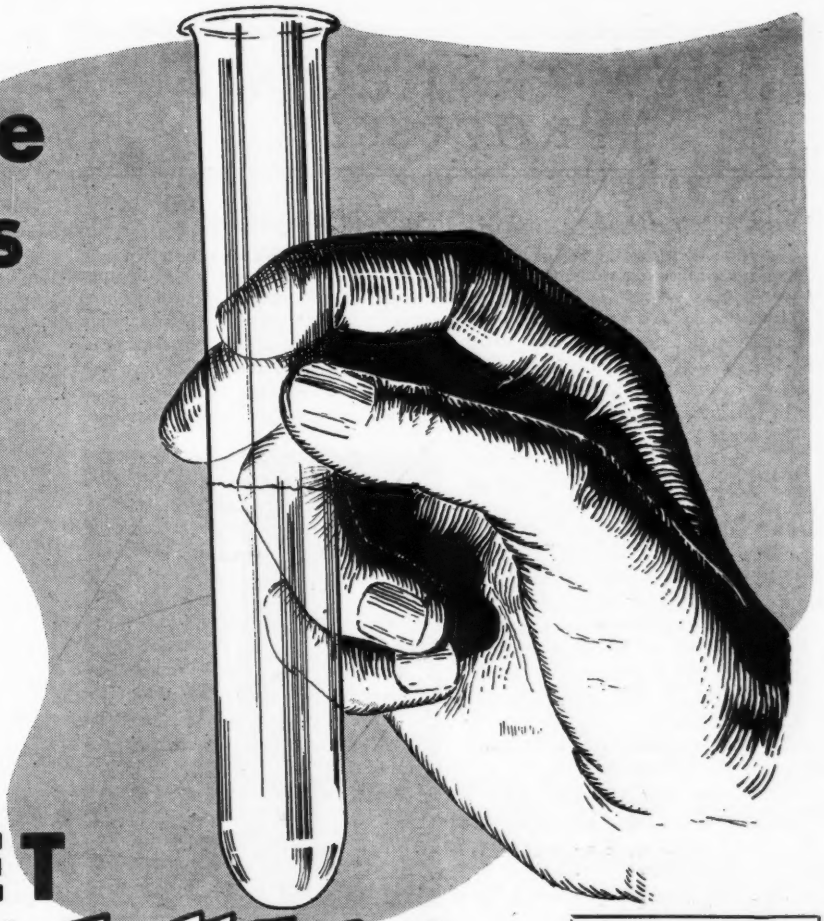
### Employe Loses Eye.

According to a recent higher court there is considerable legal distinction between the terms "occurrence of an injury" and "occurrence of an accident."

For example, in Ogle v. Tennessee Eastman Corporation, 206 S. W. (2d) 909, it was shown that an employe was handling chemicals in the course of his employment when an explosion occurred which caused fumes and poison gases to envelope complainant. His eyes were irritated and inflamed by the gas and fumes. This injury occurred July 1, 1945. The employe immediately reported the occurrence to the company foreman, who sent him to the company doctor, and the latter treated complainant until he was apparently fully recovered. He returned to work and continued in the employ of the company until February, 1947, when it

(*Turn to page 327*)

# This Test Tube Contains



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# NEW PRODUCTS & PROCESSES

## *Wood Waste Resins* NP841

**A series of phenolic resins is designed for converting wood waste into boards.**

Durez Plastics & Chemicals, Inc., has developed several closely related phenolic resins especially formulated for use in bonding wood waste (such as sawdust) for the production of building board or molded shapes.

These resins are for use in the dry mix process and are in powdered or pulverized form. The particular resin required and the percentage of resins to wood waste used (average range from 5 per cent to 15 per cent of the weight of waste) are dependent upon processing, type of wood waste, and color and strength or density desired in the finished board. Resin and wood waste mixes require hot pressing at 100 to 500 psi at around 325° F.

Samples of these Durez resins are available from the manufacturer.

## *Fluorine Compound* NP842

**3-Nitro-4-chlorobenzotrifluoride is available for research.**

A new fluorine-containing hydrocarbon is currently offered by the Hooker Electrochemical Co. 3-Nitro-4-chlorobenzotrifluoride will be of special interest to researchers and manufacturers of dyes and intermediates. The compound is a thin oily liquid with an aromatic odor. The trifluoromethyl group is chemically stable, but the nitro group may be reduced and the chloro group may be replaced.

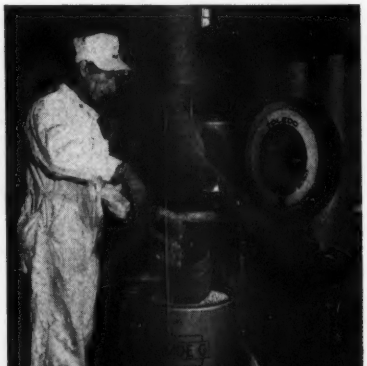
Its molecular weight is 225.5; freezing point is —7.5° C; boiling point is 222° C; and specific gravity is 1.542.

## *Pelleted Germicide* NP843

**Sodium pentachlorophenate is made in pelleted form to eliminate dusting.**

Water-soluble sodium pentachlorophenate, Dowicide G, germicide and fungicide for effective control of micro-organisms, is now immediately available in hard pellets comparatively free from dust.

Dow Chemical Co. engineers have developed this purely physical change from flake to pellet to control the dust and facilitate handling the salt during its application to industrial and agricultural products. The small cylindrical pellets are compressed to one-fourth the volume of the original flake.



The new pellets will be packed in 200-pound "Leverpak" fiber drums and will be marked *pellets* to distinguish them from the flake.

## *Aluminum Enamels* NP844

**Vitreous enamels for aluminum extend usefulness of metal.**

Enamels for some alloys of aluminum, to enhance the metal's durability, utility, and beauty, are now available from the Du Pont Co. The development is ready for large-scale evaluation by the aluminum and enameling industries.

The new enamel for aluminum is vitreous. It is fired on aluminum strips, sheets and castings in furnaces like those used to apply porcelain to steel.

Enameling of aluminum to increase its resistance to corrosion and widen its decorative uses will broaden its usefulness, particularly outdoors, where it is subject to weather and the corrosive effects of the atmosphere. Vitreous enameled aluminum sanitary ware and accessories, washing-machine tubs and agitators, architectural tile, and outdoor furniture are among immediate prospects for evaluation.

Research at the present time has developed satisfactory enamels for two alloys of aluminum, 61-S wrought alloy and 43 casting alloy.

The new enamels for aluminum contain a high percentage of lead, making them unsatisfactory for coating articles that are likely to come into contact with food.

## *Wetting Agent* NP845

**Hart Products Corp. introduces alkylated aromatic sulfonate.**

A concentrated alkylated aromatic sulfonate, said to show nearly twice the wetting-out action possessed by the conventional alkylated aromatic sulfonates, is being marketed as Hartofol C by the Hart Products Corporation. A liquid gel, it is stable to both organic and mineral acids as well as all alkalies.

## *Textile Finish* NP846

**Resin treatment stiffens textiles, confers other desirable properties.**

A textile finish which requires no curing, yet which will last through a number of launderings or dry cleanings, is designed for the treatment of cotton and rayon. Manufactured by American Polymer Corp. under the name Polyco 337, this new stiffener competes with starch in the finishing of textiles.

Currently sold only to manufacturers of textile finishes, Polyco 337 comes as a water-thin material containing 35 per cent resin solids. It requires no high-temperature curing because the evaporation of the water content fully sets the polymerized resin. No solvents are used in its manufacture. It absorbs no chlorine on bleaching. Its non-inflammable and non-toxic qualities recommend its use.

Besides laundry-resistant stiffening, Polyco 337 also provides extra resistance to soiling, abrasion and wear, increased


**CHEMICAL INDUSTRIES TECHNICAL DATA SERVICE**

**CHEMICAL INDUSTRIES, 309 W. Jackson Blvd., Chicago 6, Ill.** (2-9)

Please send me more information, if available, on the following items. I understand that nothing further may be available on some of them.

| | | | |
|---|---|---|---|
| NP 841 | NP 844 | NP 847 | NP 850 |
| NP 842 | NP 845 | NP 848 | |
| NP 843 | NP 846 | NP 849 | |

Name ..... (Position) .....
(Please print)

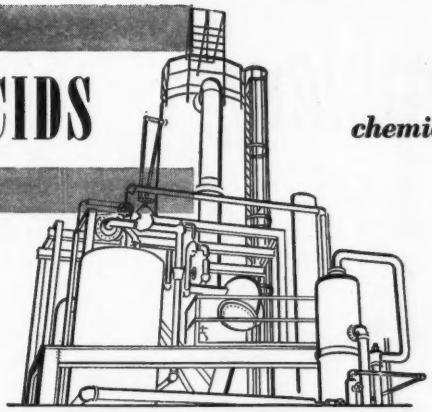
Company .....

Street .....

City ..... (Zone) ..... State .....

# FATTY ACIDS

*chemical data... product data... use data*



*fractional distillation*

## FOR EFFICIENT RAW MATERIAL UTILIZATION

Armour's patented fractional distillation process is not only the source of new products and the key to improved products, but is also the answer to more efficient and more complete utilization of raw materials. This process for the separation of crude mixed fatty acids into their pure component acids now enables industry to make use of raw materials or even waste products which previously had little or no commercial value. An excellent example is found in the case of tall oil.

Crude tall oil is a by-product of the sulphate paper industry. A mixture of rosin acids, fatty acids, color bodies, odoriferous material and unsaponifiable matter, tall oil is dark in color and has a most disagreeable odor. As a result, it has had extremely limited usage in the past, restricted chiefly to very low grade soaps and industrial coatings.

Chemists in both the United States and Europe spent many years in attempting to develop a method for processing crude tall oil into a more usable material, since huge quantities are produced annually. This work was not too successful—although straight distillation improved color and odor somewhat.

But in 1942 Armour chemists and chemical engineers began the fractional distillation of this lowest of low grade raw materials—and produced new fatty acid mixtures having valuable properties. In the face of the wartime shortage of more conventional fats and oils, this added immeasurably to the total stock of fatty materials available to industry.

Armour separates tall oil into three basic fractions, as follows:

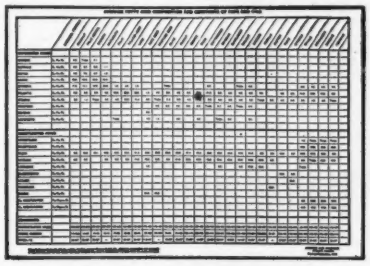
(1) the fatty acid fraction, which contains an average of 88% oleic-linoleic acids and 12% rosin acids, is sold commercially as Neo-Fat S-142. This product is light in color, mild in odor, low in unsaponifiable content, excellent for jell and liquid soaps, alkyd resins, ore flotation, etc.

Neo-Fat S-142 is also re-distilled to become Neo-Fat D-142, with an even lighter color and lower rosin acids content (6% as compared with 94% oleic-linoleic acids). Neo-Fat D-142 is especially adapted to the manufacture of alkyd resins which are non-yellowing, have superior water and alkali resistance, and excellent adhesion to metal. It is also used for special polishes, shampoos, etc.

(2) the rosin acid fraction, which is a mixture of about 70% rosin acids and 30% fatty acids (oleic-linoleic). As Neo-Fat D-242, this product has been of great interest wherever rosin has previously been used. (Neo-Fat D-242 is now specially processed for ease of handling and can be poured from a drum—unlike rosin which requires costly and inconvenient chopping, picking and shoveling). Neo-Fat D-242 is used in protective coatings, soaps, rubber reclaiming, core oils, paper sizes, linoleum, greases.

(3) the residue fraction, which is processed into Neo-Fat D-342—a tall oil pitch which is comparatively light in color with a mild odor and a smooth, glossy appearance. Since it has definite drying properties, Neo-Fat D-342 has found wide usage in paints, asphalt tile, linoleum, wire covering, etc.

Up to this time, no other process has produced from tall oil products having comparable uniformity, quality and breadth of usage.



**Handy Reference Chart.** This "Fat and Oil Composition and Constants Chart" is available upon request. This helpful chart shows the average fatty acid composition and constants of 26 widely-used fats and oils.

### FATTY ACIDS FOR BUFFING COMPOUNDS

Buffing compounds are used for cleaning and polishing metal surfaces, either before or after plating or before painting, lacquering or enameling. Since it is important that no residual trace of buffing compound be left on the polished surface, ease of cleaning is an essential factor. A high percentage of saponifiable material is preferred in formulating buffing compositions because alkaline cleaning baths are commonly used.

Buffing compounds are composed of binding agents together with abrasive and polishing agents such as tripoli, silica flour, carborundum powder, etc. Armour's Neo-Fats H.F.O., 1-60, 1-54, 1-65 are recommended for use as the binding agent, since these fatty acids increase lubrication and adhesion to the polishing wheel.

### A REMINDER FOR ALKYD RESIN MANUFACTURERS

Now that it is again possible to choose from several available fatty acids for alkyd resins, it is particularly important that you should use the specific fatty acid best suited to your product. That's why you should investigate Armour's Neo-Fats S-142, D-142, 3-R, and 11—all developed especially for the alkyd resin industry.

### USE OF FATTY ACIDS IN INSECTICIDES, FUNGICIDES AND DISINFECTANTS

Fatty acids are widely used in preparing spray emulsions for insecticides, fungicides, and disinfectants. A soluble oil base is prepared in which the active ingredients of the finished spray are dispersed. Before application, this base is diluted with water.

The emulsifying action in these oil solutions is brought about by the presence of soaps, sulphonated oils, petroleum sulphonates, etc. Generally these soaps are formed "in situ" by the saponification of vegetable fatty acids, fish fatty acids, oleic acid, etc. with the desired alkali.

Whenever practical, use of emulsions for insecticides, disinfectants, etc., is the most economical and most satisfactory method to employ, since any desired dilution with water may be obtained. Especially for these emulsions the Armour Chemical Division recommends Neo-Fat 3, 3-R, S-142, and D.D. corn, cottonseed, coconut and soybean fatty acids. Armour also offers a group of fatty acid derivatives, the ARQUADS. These alkyl trimethyl ammonium chloride compounds are valuable as the toxic agent in these same insecticides and related products.

**Free Informative Booklet.** Write for the concise, detailed booklet "The Selection and Use of Fatty Acids" which indicates how many products can be improved through the use of fatty acids and their derivatives.

**Mail this coupon today**

*(Attach to your business letterhead, please)*

Please send me, without charge, items checked below.

- ☐ Composition and Constants Chart
- ☐ Booklet, "The Selection and Use of Fatty Acids"
- ☐ Individual Data Sheets on_____

_____

*Name*_____ *Title*_____

*Firm Name*_____

*Address*_____

*City*_____ *Zone*____ *State*_____

**ARMOUR *Chemical* DIVISION**

*Armour and Company*

**1355 West 31st St. • Chicago 9, Illinois**

# Everyone has problems

Try again Jones . . . I think I saw it move.

VICTOR CHEMICAL WORKS

## If yours happens to be PRODUCT CONDITIONING

*Investigate*

## VICTOR TRICALCIUM PHOSPHATE

One of the most annoying problems confronting many manufacturers is the natural tendency of certain products to cake. However, producers of such products as salt, powdered sugar, powdered milk drinks, sulfur insecticides, and resin adhesives are solving this problem through the application of Victor tricalcium phosphate as a conditioning agent. It is preferred in that it mixes easily, has little tendency to separate out, and has great moisture-absorption capacity, thus enabling the product to remain free-flowing and non-caking. For additional information, write today or mail the handy coupon below.

**VICTOR CHEMICAL WORKS** • 141 West Jackson Boulevard, Chicago 4, Illinois

*Investigate Now!* MAIL THIS COUPON TODAY!

Victor Chemical Works
141 West Jackson Blvd., Chicago 4, Illinois

Gentlemen:
Please send additional information on Victor tricalcium phosphate for conditioning.

Name_____ Title_____

Company_____

Street_____

City_____ Zone_____ State_____

V2

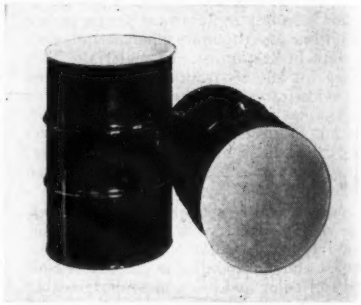

fabric strength, and does not discolor on exposure to light or embrittlement on aging. Users of Polyco 337 will experience no difficulties in calendering and can drying operations.

### *Tank, Drum Lining* NP 847

**Plastic lining provides protection in drums and tanks.**

Cycloflex PC-11 Plastic Lining, made by the Poly-Cyclo Products Co., is a rugged, chemically-inert membrane developed specifically for the protection of drums and tanks.

Cycloflex provides resistance to corrosion and chemical attack. Inorganic acids, alkalies, aliphatic hydrocarbons, water, oils, grease, oxidants, cleaners and even the stronger oxidizing reagents such as nitric and chromic acids are readily repelled. This white lining is entirely non-contaminating to any plating



solution including rhodium, gold, etc. Drums and tanks lined with Cycloflex white have a smooth high-gloss finish that makes them easy to drain and easy to clean.

Cycloflex is also available in high-gloss black. Both linings withstand great fluctuations in temperature and will not break, crack, chip or peel even at high temperatures. High bond strength, superior density and seamless construction eliminate all possibilities of porosity and spot corrosion.

### *Uridine* NP 848

**A nucleoside obtainable from nucleic acid is now available for biochemical research.**

Uridine, a compound having the pyrimidine, uracil, linked to the pentose, *d*-ribose, and one of the two pyrimidine nucleosides obtainable from nucleic acid, is now offered for biochemical research purposes by Schwarz Laboratories, Inc. This and the other derivatives obtained by varying intensity of nucleic acid hydrolysis are of increasing interest in studies of enzyme activity, cell behavior and metabolism, and the nutrition of microorganisms.

Uridine has not been studied biochemically to the same extent as its purine analogs, adenosine and guanosine, partly because the latter are much more readily

# CELANESE* ACETIC ACID

$CH_3-C(=O)-OH$

Celanese* Glacial Acetic Acid, with a purity greater than 99.5%, is now being made available to a much greater portion of American industry. The high quality of this chemical makes it ideally suited for applications in pharmaceuticals, textile treatment and in organic syntheses. This versatile acid is also used in the production of acetate esters for the varnish and lacquer industries.

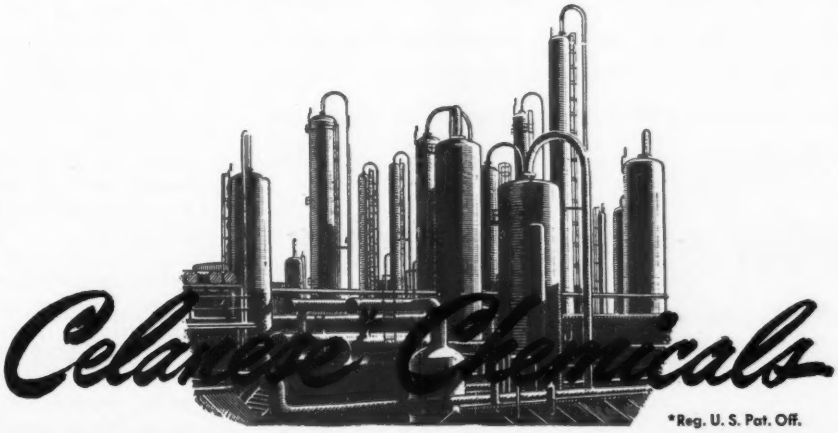
| | |
|---|---|
| Water Content | 0.5% by weight, maximum |
| Freezing Point | 15.6° C., minimum |
| Specific Gravity | 1.050 to 1.055 @ 20/20° C. |
| Color | Water White |
| Formic Acid Content | 0.2% by weight, maximum |
| Non-Volatile Matter | 0.001% by weight, maximum |
| Iron Content | 1.0 PPM by weight, maximum |

A new brochure is available containing specifications and general information on many of the Celanese* Organic Chemicals. Write for your copy—and call Celanese whenever you need technical assistance regarding organics.

CELANESE CORPORATION OF AMERICA
Chemical Division
180 Madison Avenue, New York 16, N.Y.

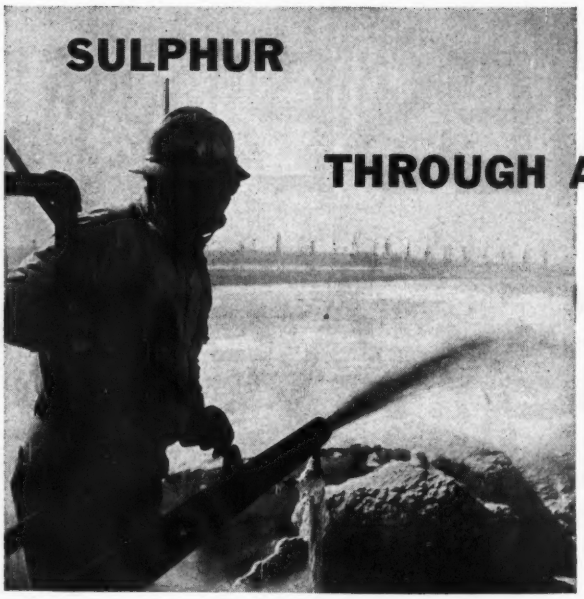
## CELANESE* FORMALDEHYDE

**Formaldehyde, one of the most important products in the growing family of Celanese Organic Chemicals, is now offered in greater volume. This high quality, U.S.P. chemical is sold commercially as Formalin, a water white solution containing 40% formaldehyde by volume, 37% by weight. It is obtainable in both methanol inhibited and uninhibited grades.**




*Reg. U. S. Pat. Off.

**ALCOHOLS • ALDEHYDES • GLYCOLS • KETONES • ACIDS • SOLVENTS • PLASTICIZERS • INTERMEDIATES**




*Molten Sulphur is sprayed into a storage vat at the Grande Ecaille property of Freeport Sulphur Company in Louisiana.*

*One of a series of Stories of Sulphur*

SULPHUR is mined through a pipe. On the Gulf Coast Sulphur is mined not as solid but as liquid; not by pick and shovel but by superheated water. Sulphur men use water and pipes and air pressure for tools and learn from instruments about the deposits they never see.

HEATED under pressure to 320 degrees Fahrenheit, the water is piped down hundreds of feet to melt the Sulphur in its underground deposit. Molten streams of yellow mineral are forced to the surface, and still glowing are poured into the storage vat to cool and harden.

THOUSANDS of feet of pipe carry the compressed air, water and molten Sulphur and millions of gallons of water are used in the process. Great power plants keep pumps, compressors and boilers operating and sensitive instruments record temperature and pressure.

**FREEPORT SULPHUR COMPANY**

**OFFICES: 122 East 42nd Street, New York 17, N. Y.**

**MINES: Port Sulphur, Louisiana • Freeport, Texas**

**SULPHUR SERVES INDUSTRY**


prepared. With uridine now available in ample amounts for biochemical and biological research purposes, studies of its functions and behavior in biological systems should be of interest.

It is known, for example, that uracil, the pyrimidine base of uridine, is required as a nutrient by a number of microorganisms. Will they also accept uridine in which the uracil is modified by a glycoside linkage to *d*-ribose, equally, preferentially, or with significant differences in physiological behavior? The metabolism of this nucleoside in higher animals would also be of interest.

### *Nitrogen Isotope* NP 849

**Eastman makes nitrogen isotope available in nitric acid, potassium nitrate.**

Eastman Kodak Company has announced the availability of Nitrogen 15 in the form of either nitric acid or potassium nitrate. The company has been supplying $N^{15}$ in the form of ammonium salts and as potassium phthalamide in concentrations up to 60 atom percent $N^{15}$. (The ammonium nitrate has $N^{15}$ only in the ammonium radical, not in the nitrate.)

For much research in agricultural chemistry scientists desire to follow the course of nitrate in plants. Some research workers have prepared nitrates from Kodak ammonia, usually by biological oxidation, but in general the process has been time-consuming.

The compounds now available will reduce the number of steps involved. They may prove useful also in study of explosives and in the synthesis of organic nitro compounds and derivatives.

Nitric acid will be supplied as an aqueous solution containing at least two moles of $HNO_3$ per liter. The potassium nitrate will be sold as a dry solid.

### *Repair Cement* NP 850

**Corrosion-resistant cement makes repairs in glass-lined and metal equipment.**

An improved version of Carboline A, a repair cement for glass-lined equipment introduced a few years ago, has been developed by the Carboline Co. and is being sold as Carbo-Fix. The new material adheres to metal as well as glass, enables the plant operator to make temporary—sometimes permanent—repairs in process equipment, and to make joints in glass piping.

A Carbo-Fix joint or repair is made by mixing a fluid and a powder into a paste which is applied to the work. Polymerization proceeds at 60° F. or above and solidifies the mixture. Speed of setting depends on the temperature, and in hot weather the substance may set in less than an hour.

The cement is unaffected by most acids, solvents and alkalis. Sulfuric acid above

# *Carefully Controlled Chlorine Content in HOOKER SULFUR CHLORIDES*

Where it is not feasible to use elemental chlorine in your processes, Hooker Sulfur Chlorides, mono and di, provide chlorine in convenient to use form. You can always be sure, too of a carefully controlled chlorine content.

Hooker Sulfur Monochloride contains a minimum of 50% chlorine, and Hooker Sulfur Dichloride has a minimum of 66% chlorine.

Other Hooker Chlorinating agents are sulfuryl chloride, thionyl chloride, hydrogen chloride, phosgene and chlorine. Bulletin 328A—"Chlorinating Agents" gives more detailed information on these chlorinating chemicals. Technical Data Sheets on each describe in detail the physical and chemical properties. Copies of this bulletin or individual Technical Data Sheets are available when requested on your business letterhead.

Hooker Technical Staff is also ready to help you with your specific problems involving Hooker Chemicals.

## HOOKER RESEARCH PRESENTS
### SODIUM CHLOROACETATE
$Cl \cdot CH_2 \cdot COONa$

Molecular Weight ..... 116.49
Melting Point ..... Decomposes at about 200° C before reaching a melting point

Hooker Sodium Chloroacetate, a new development of the Hooker Research Laboratories is a white, odorless non-hygroscopic, free-flowing powder. On standing open to atmosphere, it loses its moisture over a period of 3 to 4 days, after which no further loss in weight occurs. It is ground and sieved through No. 10 mesh screen. It is completely and quickly soluble in water, slightly soluble in methanol, insoluble in acetone, benzene, ether and carbon tetrachloride.

For monchloroacetic acid reactions which require the replacement of the chlorine atom under alkaline or neutral conditions, the use of Sodium Chloroacetate removes the necessity of this step by providing the salt for the reaction. It is much more convenient and safer to handle than the acid. It eliminates hydrolysis losses from heat of neutralization and consequent diminished yield of product.

Hooker Sodium Chloroacetate is at present available in pilot plant quantities. Technical Data Sheet No. 375 gives physical and chemical characteristics and typical analysis. When requesting samples or literature, please write on your business letterhead.

## SULFUR DICHLORIDE $SCl_2$

Molecular Weight ..... 103
Description ..... Brownish red liquid
Freezing Point ..... −78°C
Boiling Point ..... Decomposes above 40°C
Specific Gravity at 15.5°C ..... 1.638
Analysis ..... Minimum chlorine by wt. 66%

**USES**

Sulfur Dichloride is a chlorine carrier; used as a special chlorinating agent and as a chloridizing agent in metallurgy; as a reagent in the manufacture of organic acid anhydrides and other organic chemicals, in manufacture of insecticides, rubber cements, rubber substitutes; in the treatment of drying oils for special use in varnishes; in general as a replacement for sulfur monochloride in processes where a higher chlorine content is desired.

## SULFUR MONOCHLORIDE $S_2Cl_2$

Molecular Weight ..... 135
Description ..... Yellow to slightly reddish liquid
Freezing Point ..... −80°C
Boiling Point ..... 138°C
Specific Gravity at 15.5°C ..... 1.690
Analysis ..... Minimum chlorine by wt. 50%

**USES**

Sulfur Monochloride is used in the manufacture of organic chemicals, rubber substitutes; an agent for cold vulcanization of rubber products; a polymerization catalyst; reagent in manufacture of insecticides, chemical intermediates, phenolic resins, and other diversified chemicals; solvent for sulfur.

*From the Salt of the Earth*

HOOKER ELECTROCHEMICAL COMPANY

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HOOKER CHEMICALS

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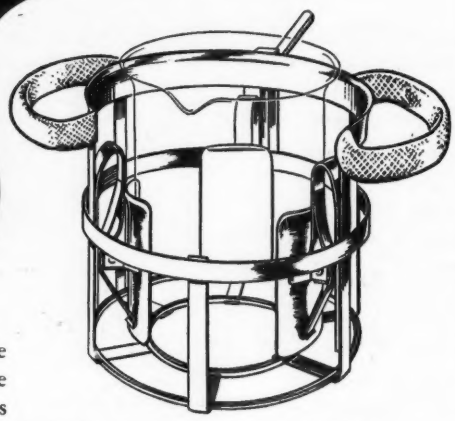
SODIUM SULFIDE • SODIUM SULFHYDRATE • SODIUM TETRASULFIDE • CAUSTIC SODA • MURIATIC ACID • PARADICHLOROBENZENE • CHLORINE

# WILL SAFETY BEAKER HOLDER

## Exclusive WILL Safety Device

• SHIELDS THE OPERATOR •

• PROTECTS THE CONTENTS



Most accidents in the laboratory result from the lack of proper appliances for handling the larger receptacles containing hot or corrosive liquids. Laboratory directors, responsible for proper safety measures, are endorsing this new Will Safety Beaker Holder* as their best protection against this type of accident.

No longer is it necessary to use asbestos gloves, a towel or the bottom of your apron in handling and transferring hot liquids. This exclusive Will item has an insulated handle on each side for ease in safely transporting and pouring larger volumes of liquids.

The Holder is the only device available that protects both the sides and bottom of beakers against mechanical shock. It prevents direct contact of a hot beaker with a cold table top, and guards the operator's hands from spillage.

The Will Safety Beaker Holder is made entirely of tough, springy, polished 18-8 stainless steel with spot-welded joints, and will accommodate 1000 ml., 1500 ml., and 2000 ml. Griffin form beakers. Beakers in any of the three sizes can be inserted easily and are securely held by spring holders. When a beaker is removed, the spring holders are so angled that they are immediately in position to receive another beaker.

The handles are covered with woven asbestos pads which insulate the hands against excessive heat. The 6-inch rod for clamping the holder to a support stand is provided with a new type slot lock which permits easy disconnection of the Safety Beaker Holder without removing the rod from the clamp.

**5016 — WILL SAFETY BEAKER HOLDER, as illustrated but without beaker ..... $15.00**

*Pat. Applied For.

*Write, Teletypewrite, Wire or Phone Dept. CI-2*
*Our Nearest Office-Warehouse*

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**WILL CORPORATION**
LABORATORY APPARATUS AND CHEMICALS
ROCHESTER 3, N. Y. • NEW YORK 12, N. Y.
SOUTHERN SCIENTIFIC CO., INC., ATLANTA 3, GA.
BUFFALO APPARATUS CORP., BUFFALO 5, N. Y.


45 per cent strength and nitric acid are the only common corrosives that will affect the resin. The material also withstands temperatures up to 350° F., above which it does not flow, but decomposes slowly.

The set resin is very hard, usually requiring a hammer and cold chisel for breaking it. It is not durable under flex, but flexure is not a typical service condition.

Carbo-Fix adheres to some surfaces—glass and bronze, for example—directly. Other surfaces, like steel, require the application of Carbo NTS Primer for good results.

## *Nickel Porosity*

**Researches are under way to reduce porosity of electrodeposited nickel.**

The Research Committee of the American Electroplaters' Society has reported an outstanding discovery on the porosity of nickel from the Society's currently sponsored researches.

The Research Directing Committee reported that the porosity of electroplated nickel foil varies with the crystal structure of the deposit. Since it has been generally conceded that wrought foils are less porous than similar electrodeposited foils from commercial baths, this discovery may well prove to be the cornerstone for improving the corrosion resistance of nickel electrodeposits. Future researches on this subject will determine if nickel baths operating under commercial conditions can be modified to give a crystal structure with an improved corrosion resistance. Dr. N. Thon, of Princeton University, is conducting work on this project entitled "Nature and Effect of Porosity in Electrodeposits."

## *Concrete Aggregates*

**New production methods for lightweight concrete aggregates developed by Bureau of Mines.**

New and efficient methods for the production of lightweight concrete aggregate from clays, shales, slates, coal-mine wastes, and other mineral materials have been developed by the Bureau of Mines.

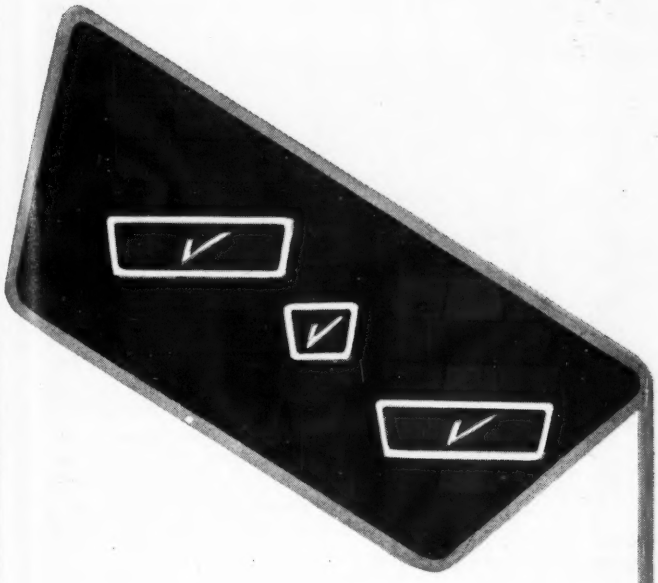
At Tuscaloosa, Ala., the Bureau investigated clays; at Norris, Tenn., shales; and at College Park, Md., slates and other potential raw materials. Materials were classified as to their bloating or expanding characteristics—necessary to the production of aggregates. Not only were natural bloating clays and shales studied, but means were developed to cause most non-bloating materials to bloat controllably. Studies were made of the causes of bloating and definite bloating agents were added in various ways. The best products resembled a foam and not a sponge, and the strongest-foamed products were those with the smallest sealed-in bubbles of gas.

# Mallinckrodt SILVER SALTS for industry

SILVER NITRATE
SILVER CYANIDE
SILVER OXIDE

**are made only from carefully selected**

**SILVER BULLION**



Acceptance of **Mallinckrodt Silver Nitrate** for the exacting manufacture of photographic films and silvering of mirrors indicates its supreme quality better than any specifications could. **Mallinckrodt Silver Nitrate** is so pure that it is light-stable. The foreign heavy metal content is so low that a whole carload contains only about one cubic inch.

The same fine raw material, the same skillful processing, the same high standards give all **Mallinckrodt** silver salts this same ***uniform, dependable purity.***

**Silver compounds for Industrial, Photographic, Medical and Analytical Uses**

| | |
|---|---|
| Silver Metal A.R. Precip. | Silver Acetate |
| Silver Carbonate A.R. | Silver Chloride |
| Silver Chloride A.R. | Silver Cyanide |
| Silver Iodide | Silver Lactate |
| Silver Nitrate C.P. Crystals | Silver Nitrate A.R. (A.C.S.) |
| Silver Nitrite | Silver Oxide U.S.P. IX |
| Silver Protein Mild U.S.P. XIII | Silver Protein Strong N.F. VIII |
| Silver Sulfate | Silver Sulfate A.R. (A.C.S.) |
| Lunar Caustic U.S.P. XIII (No. 1) | Lunar Caustic No. 2 |

*82 Years of Service to Chemical Users*

## Mallinckrodt Chemical Works

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MONTREAL • PHILADELPHIA • SAN FRANCISCO

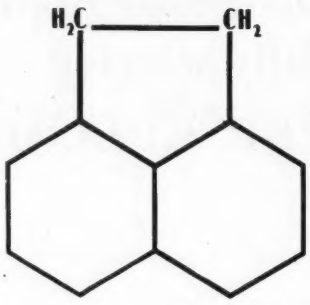
FINE CHEMICALS Mallinckrodt SINCE 1867

UNIFORM, DEPENDABLE PURITY

# A Unique Hydrocarbon

# Reilly

# ACENAPHTHENE




**PURITY: 95% min.**

**BOILING POINT:**
**Approximately 277° at 760 mm.**

**FREEZING POINT: 91° C.**

**SOLUBILITY:**
**Insoluble in water. Soluble in most common organic solvents including alcohols, ethers, ketones, esters, aliphatic and aromatic hydrocarbons, and chlorinated aliphatic and aromatic hydrocarbons.**

**Shipping Containers: 200 lb. (approx.) barrels**

**Reilly Acenaphthene may be nitrated, sulfonated, halogenated and otherwise processed. The oxidation of Acenaphthene gives Naphthalic Acid, a dibasic acid which reacts to give interesting resins of the alkyd type. Partial oxidation gives Acenaphthenequinone, a reactive compound which is a starting material for several vat dyes. Dehydrogenation yields Acenaphthylene, a monomer which readily polymerizes to a high melting point polymer having unusually good electrical insulating properties. Acenaphthene is also applicable as a rubber extender, compatible alike with natural and synthetic rubbers.**

**These chemical reactions suggest the many possibilities which this unique hydrocarbon offers research workers in rubber, paints, dyestuffs dielectric materials and other organic syntheses. Your inquiries on Acenaphthene, or any other coal tar chemicals, are invited.**

OTHER *Reilly* HYDROCARBONS

**Anthracene** **Fluoranthene** **Fluorene**

**1—Methylnaphthalene** **2—Methylnaphthalene**

**Naphthalene** **Phenanthrene**

**REILLY TAR & CHEMICAL CORPORATION**

**MERCHANTS BANK BUILDING • INDIANAPOLIS 4, IND.**

**500 Fifth Avenue, New York 18** **2513 S. Damen Avenue, Chicago 8, Ill.**

*Reilly Coal Tar Chemicals For Industry*


Conducted by the Metallurgical Division of the Bureau, tests were made in small, electrical and gas-fired furnaces and in gas and oil-fired rotary kilns. Aggregate samples also were tested by the Bureau of Standards for strength and other qualities.

Lightweight aggregate products consist of low-cost, low-strength aggregate suitable for use in building blocks such as cinder blocks, and high-quality, high-strength aggregates used in structural concretes and capable of withstanding heavy loads.

## *Potato Flour*

**New process permits flour manufacture at two cents a pound.**

Tons of cheap, nutritious potato flour can be made by a new process at a cost of less than two cents a pound, according to the Eastern Regional Research Laboratory of the United States Department of Agriculture. If bleaching and sorting steps are omitted, livestock feed can be produced for slightly more than a cent a pound.

The new process was developed in response to the request of the Commodity Credit Corporation for 200,000 tons of potato flour for export.

Use of existing installations, such as idle distillery equipment, would further reduce the cost of the product, which contains 98 per cent of the whole potato.

For human consumption, the potatoes are first washed and sorted, bad specimens being removed. Then they are ground, bleached with a little sulfur dioxide gas, and finally dried in steam heated tubes. Sticking is avoided by recycling some of the dried product and mixing it with freshly ground potatoes to maintain a moisture content of less than 45 per cent. Direct heat driers can be substituted for the steam tubes if precautions are taken to insure that no spark is conveyed into the air stream, in which the concentration of potato starch may reach explosive concentrations.

## *Asphalt Improvement*

**A series of integrated tests will improve asphalt utilization.**

A new series of tests described by Edmund Thelen, of The Franklin Institute, has been devised to measure the properties of asphalt-like materials.

Four of the methods, measuring resistance to impact, damage by vibration, flow at high temperatures, and adhesion to rocks and fibers, are believed to be new in their application to asphalts; while the fifth, which shows whether an asphalt will run on a warm day or crack upon sudden cooling, employs novel experimental techniques.

One test reveals the flow properties of asphalts at temperatures from 0°-45°F.

Shown here is one view in the spotless modern plant where Swift's Animal Protein Colloid is made. Operation is continuous, automatic . . . the product is "untouched by human hands," not contaminated by foreign substances.

# Investigate this Modern Process Agent:

## Swift's Animal Protein Colloid*

(made from an exclusive Swift Process)

*Does your manufacturing process require . . .*

1. An emulsifier?
2. A flotation agent?
3. A gel structure?
4. A settling agent?
5. A protective coating?
6. A sizing agent?
7. A carrier of pigments?
8. An impregnating agent?
9. A base for pigment?
10. An oilproofing agent?
11. A flocculating agent?
12. A clarifying agent?
13. A filtering agent?
14. A stiffening agent?
15. A mordant?

This modern process agent, Swift's refined Animal Protein Colloid, has properties which may be employed in a wide number of processes. Even though you have used other processing agents, be sure you investigate Swift's Animal Protein Colloid now. It has unusual properties. It may meet the requirements of your present operations or help in developing new ones.

*Commercially high quality bone glue.

### *What is this modern process agent?*

Swift's Animal Protein Colloid is made by an exclusive Swift process. Protein liquor is extracted from bones and highly concentrated. This pure liquid falls on a bed of dry finished product which adheres evenly to the droplets. Then, by continuous and automatic schedule, these droplets travel through driers and are milled and screened. This whole operation is under *precise synchronized control* and is completed in relatively short time.

The result is a uniform granular form that goes into solution rapidly. It's a purified product, light amber in color.

Because plant and machinery are kept spotlessly clean — the finished product does not touch material which can contaminate it with foreign substances . . . because of the precise control possible with Swift's exclusive process, Swift can bring you this *superior* processing agent. And Swift's Animal Protein Colloid has the same high quality and uniform characteristics the year 'round.

**Swift's technical service yours, investigate now**

Write or phone for one of Swift's special representatives. He will call and discuss Swift's Animal Protein Colloid with you. This process agent may be just what you are looking for. Write to:

**Swift & Company**

ADHESIVE PRODUCTS DEPARTMENT

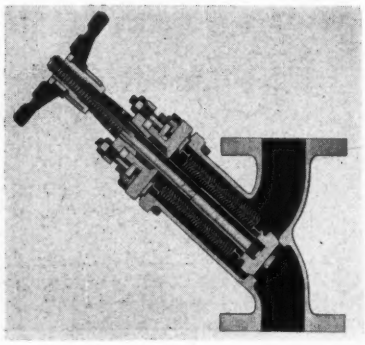
**4109 Packers Avenue, Chicago 9, Illinois**

# NEW EQUIPMENT

## *Packless Valve* QB 726

**All-welded bellows of corrosion resistant alloys withstand dangerous liquids and gases in new packless valve.**

Magnilastic Div. of Cook Electric Co. has developed a standard series of corrosion resistant metal bellows of all-



welded construction which seal valve stems against any and all corrosive agents. These bellows-sealed valve stems are designed and adapted to a wide range of valves manufactured by a number of valve manufacturers as a specialized service. Magnilastic does not manufacture these valves.

Packless bellows-sealed valves of corrosion resistant alloys give greatly extended protection from leakage traceable to corroded seats, stems, and packing. In addition, the possibility of expensive equipment damage, shut downs or serious accidents is effectively minimized.

The welded, leak-proof bellows completely surrounds that lower part of the valve stem which is within the valve body. This bellows is welded at its lower end to the top of a disc, and at the top end, to a collar which fits into the body neck. This offers an effective seal against the entrance of any medium corrosive or otherwise, into the stem chamber.

The bellows itself, which is the heart of this new series of valves, consists of corrosion resistant, formed metal diaphragms welded alternately at their inner and outer circumferences. The complete bellows are tested to the individual valve manufacturer's specifications and in the case of vacuum services can be manufactured with leak rates less than one micron per cubic foot per hour, as determined by mass spectrometer sensitivity.

The bellows units can be made of nickel, monel, stainless steel, inconel and other weldable metals which have the desired corrosion resistant characteristics.

## *Ring Packing* QB 727

**Greene, Tweed & Co. introduces non-extrusion ring packing.**

A ring packing, which eliminates the damaging effect of extrusion of packing material into the clearance space between the mating parts, is now being manufactured by Greene, Tweed & Co.

Palmetto G-T ring packing consists of a resilient sealing ring of synthetic rubber in a T-section backed up or supported on each side by two non-extrusion ring retainers or guards. These non-extrusion rings are split and are made of laminated phenolic material. Installation is such that the synthetic rubber member is under slight compression which provides the static seal.

When the operating pressure is increased, the flange of the G-T ring expands radially against the non-extrusion rings, thus holding them in contact with the surface of the cylinder or piston rod. This action prevents the sealing surface from being damaged by extrusion into the clearance space between the mating parts.

These packings may be used in systems where the temperatures range from —70°F to 250°F and not leak or fail over extended periods of operation with pressures anywhere from 0 to 3000 psi. Actual laboratory tests have been run at a pressure of 10,000 psi.

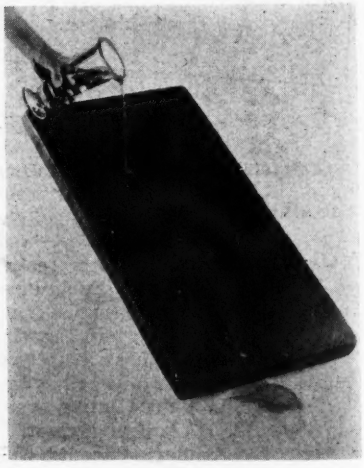
## *Insulation* QB 728

**New low-temperature insulation is being produced by Johns-Manville.**

Zerolite is a new low-temperature insulation possessing exceptional fire- and chemical-resistant qualities made by Johns-Manville and now available nationally in the form of sheets, lagging and pipe insulation.

Zerolite is especially designed for service within the temperatures of —400° F and +250° F. Made of mineral wool and a resin binder, it is an inorganic material that combines high fire resistance, immunity to many organic solvents, and excellent moisture resistance with low heat conductivity. Zerolite is classified as fire resistant and will pass the hot rivet test as described in Maritime Commission specification 32-MC-2.

The many organic solvents to which Zerolite is immune include benzol (*see cut*), methyl ethyl ketone and petroleum fractions and derivatives. It shows a moisture absorption of 0.0% after 96 hours in air of 75% relative humidity, and a



water absorption of only 2.0% by volume after being submerged for 24 hours.

The low heat conductivity values for Zerolite at several mean temperatures are .28 at 70° F, .25 at 0° F, and .22 at —70° F.

Zerolite is particularly recommended for the equipment, tanks, vessels and pipes used by the oil and chemical industries where fire resistance and immunity to solvents are of special importance.

## *Temperature Control* QB 729

**Low initial cost and improved maintenance are claimed for new motorized-valve temperature controller.**

A new combination motorized-valve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**CHEMICAL INDUSTRIES, 309 W. Jackson Blvd., Chicago 6, Ill. (2-9)**

Please send me more information, if available, on the following items. I understand that nothing further may be available on some of them.

| | | | | | | |
|---|---|---|---|---|---|---|
| QB726 | QB731 | QB736 | QB741 | QB746 | QB752 | LE112 |
| QB727 | QB732 | QB737 | QB742 | QB747 | QB753 | LE113 |
| QB728 | QB733 | QB738 | QB743 | QB748 | QB754 | LE114 |
| QB729 | QB734 | QB739 | QB744 | QB749 | QB755 | LE115 |
| QB730 | QB735 | QB740 | QB745 | QB750 | QB756 | LE116 |
| | | | | QB751 | QB757 | |

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...BUT...THIS KIND OF PROTECTION IS ONLY ONE OF THEIR FUNCTIONS

Bemis Waterproof Laminated Textile Bags are extra strong, and they're specially constructed to guard against:

- Change in moisture content
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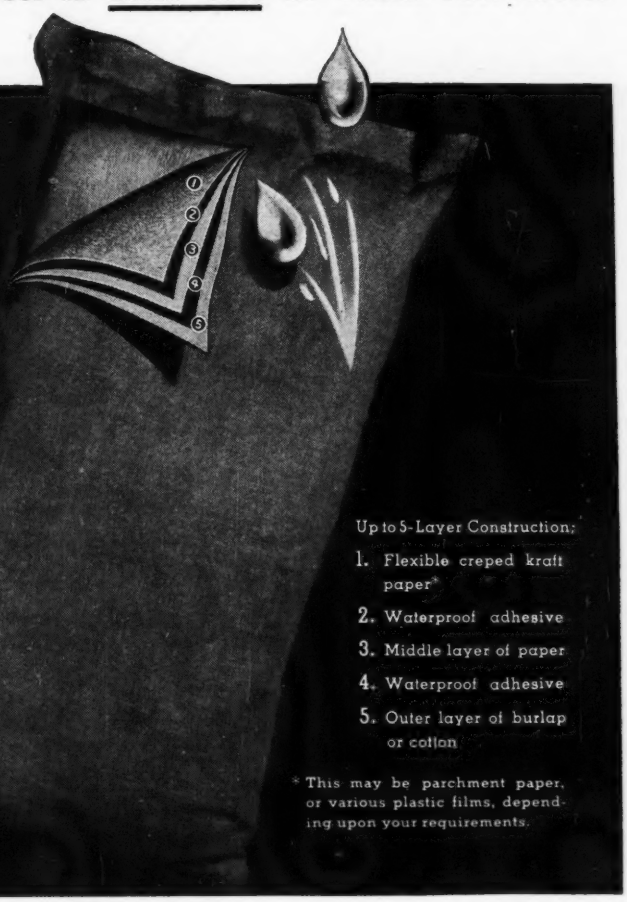
- Sifting losses
- Undesirable odors
- Insect infestation
- Loss of aroma




Up to 5-Layer Construction:

1. Flexible creped kraft paper*
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4. Waterproof adhesive
5. Outer layer of burlap or cotton

* This may be parchment paper, or various plastic films, depending upon your requirements.

If you have a "hard-to-pack" product or one that must stand the rough handling of l.c.l. truck, or export shipment, it will pay you to investigate the advantages of Bemis Waterproof Bags.

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temperature controller is being introduced by Minneapolis-Honeywell Regulator Co., through its Brown Instrument Co. Div.

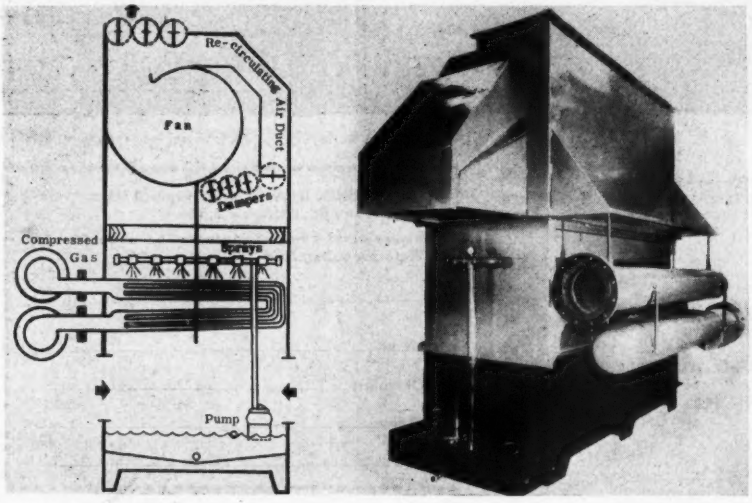
The new device is a temperature controller and motorized valve combination for on-off, two-position, floating or proportional control. Speedier and more economical installation as well as improved maintenance are claimed. In operation, a remote-bulb thermal system positions a powerful motorized valve in response to temperature changes. The unit is available with temperature ranges between —50° and +700°F and with different sizes and types of valves. The self-contained assembly includes valves, linkage, motor, transformer and temperature controller.

## *Gas Dryer* QB 730

**Recirculating air in gas dryer obviates danger from freezing and permits year-'round outdoor installation.**

The new model of the Niagara Aero after cooler dehydrates compressed air or gas by cooling it to a temperature below the dry bulb temperature of the atmospheric air, thereby removing the moisture that condenses at that point and preventing further condensation of water in air or gas lines in use. This is done by evaporating a recirculating water spray on the surface of a coil through which the compressed air passes, creating a temperature close to the wet bulb temperature of the surrounding atmosphere and lower than the dry bulb temperature and also below the summer surface water temperature.

In the new model, protection against freezing is given by the use of the "Balanced-Wet-Bulb" control. A thermostat in the spray water reservoir, set for a desired low temperature limit, operates dampers to recirculate the air stream internally around a division plate in the center of the unit, instead of drawing in freezing air. This permits outdoor installations. The Aero After Cooler consumes less than 5 per cent of the cooling water required by conventional coolers. No cooling tower is required.




•QB 731 A newly designed *centrifugal fan* with back-tilted blades has been introduced by the Sturtevant Division of the Westinghouse Electric Corp.

The increased effciency was achieved by a combination of several design changes in the fan's blading, wheel, inlet, back plate and scroll. Most significant is the design of the new fan's scroll, the spiral housing that surrounds the revolving blades.

The new Silventvane, Design 10, will be available in 23 sizes, with wheels ranging from one to nine feet in diameter. Installed in its housing, the largest model will stand nearly 18 feet high. It will be capable of moving 480,000 cubic feet of air a minute.

• QB732 A complete new line of A-C *magnetic starters* is now in production by General Electric's Control Division. Designed for starting and protecting motors up to 50 hp, the new full-voltage starters are furnished in all NEMA sizes from 0 through 3. The contactors can be furnished in NEMA sizes from 00 through 3.

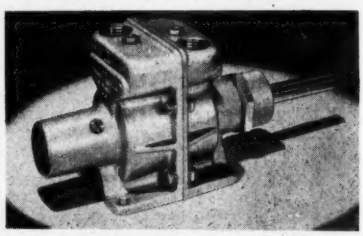
An important feature of these starters is the one-piece plastic-encased coil enclosure which effectively protects the windings against dirt, moisture, or possible damage during installation. The clamp-type coil terminals are firmly embedded in this enclosure to prevent loosening. Self-lubricated vertical slots in the sides of this enclosure permit the magnet armature guides to move quietly and smoothly.

• QB733 A new line of Chromalox *multiple-element electric immersion heaters* for high-pressure, high-temperature applications has been introduced by Edwin L. Wiegand Co.

Capacities of the new heaters, Type TMO, vary from 1 to 100 kw. Hair-pin shaped Chromalox elements, of triangular cross-section, are welded into the heavy forged-steel flanges and are so arranged as to permit the liquid to circulate freely. Units are available in steel, stainless steel or Inconel sheaths as required for various corrosive liquids.

• QB734 The new Series 1700 Temco *electric furnaces* of the Thermo Electric Mfg. Co. employ a unique door arrangement. To permit access to the heating chamber with minimum loss of heat the heavily insulated door has been divided into an upper and lower section. Both sections are controlled by a single counterbalanced lever. By moving the lever from the forward position to vertical the lower section is lowered separately while the upper section remains in place. A further 60° movement of the lever will raise the top section and expose the full chamber. The furnaces may be operated continuously up to 1650°F and intermittently up to 1900°F.

• QB 735 A new *gearless pump* for the industrial handling of liquids is available from Eco Engr. Co. The new pump



includes a new dual eccentric piston design which gives a strong flow against pressure.

Pump body is of sturdy naval bronze forgings or stainless steel precision castings.

Available in four sizes, ¼", ⅜", ½" and ¾", these Eco gearless pumps have capacities ranging from 1-12 gpm. Pumps are available for use against pressures ranging from 0-100 lbs. per sq. in. They can be run and will deliver at speeds from 200 to 2400 rpm.

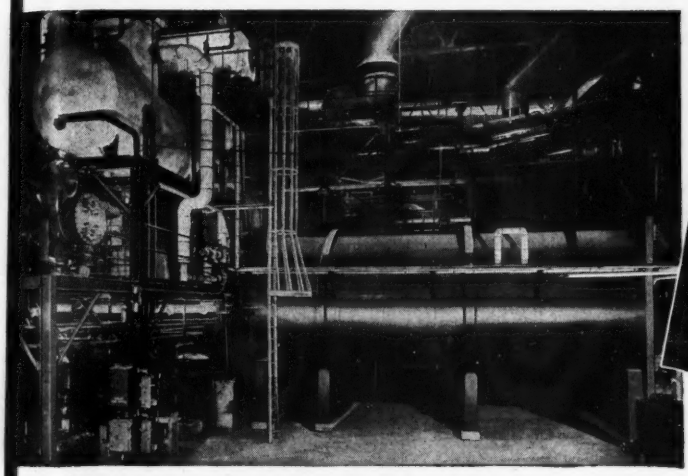
• QB736 The No. 2 *S-P mill,* a modification of the No. 2 Mikro-Pulverizer of Pulverizing Mach'y Co., will handle clay bodies having a moisture content of from 18 to 22 per cent, the only machine available for disintegrating and sizing clay bodies in one operation. This mill will meet mesh specifications over a wide range of controlled particle sizes from coarse granulation in the 8 mesh size to fine granulation in the 20 mesh size. Mixtures or bodies containing silica, feldspar or similar abrasives can be handled without excessive wear or high maintenance.

In the new model, a roll or drum has replaced the belt feed to provide a ma-

# World's Largest

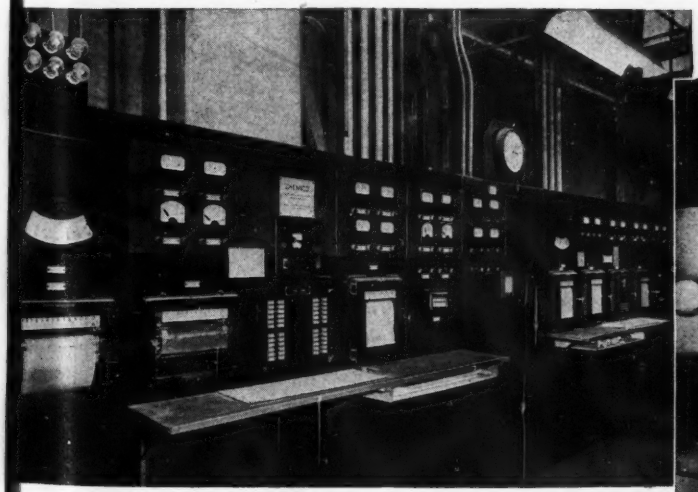
## *single unit sulfur burning contact acid plant*

**This sixth Chemico Contact Sulfuric Acid Plant for Standard Wholesale Acid and Phosphate Works in Baltimore, Md. was successfully placed in operation in December, 1948 and is regularly operating above guaranteed capacity of 500 tons per day. (100% equivalent $H_2SO_4$).**



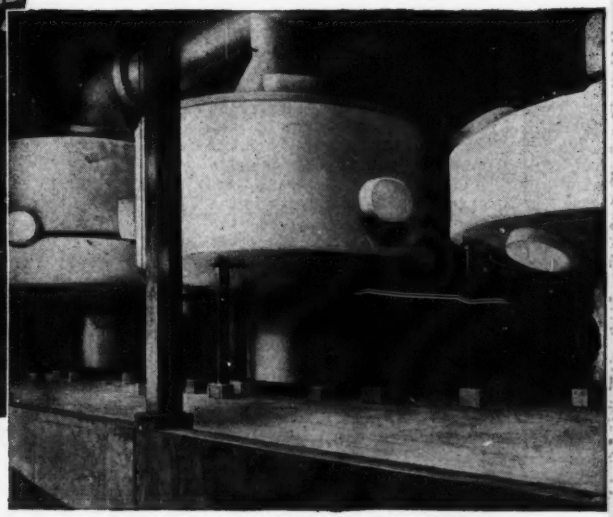
▲ At the right is the Sulfur Furnace with the waste heat boiler, condenser and auxiliary apparatus at the left. This furnace burns over 170 tons of sulfur a day.

▲ Towers for the production of oleum, 98% acid and for the drying of combustion air. These are part of the drying and absorption system.



▲ Here are control panels for two of the six Chemico Contact Acid Plants. The new 500-ton plant panel is on the right.

▼ Shown left to right are the secondary converter, the primary converter and the gas filter.



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*Chemico Plants are profitable investments*

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★ **With Special Reference to the Chemical Process Industries**

**Edited by**

**RICHARD M. LAWRENCE**
**Development Department**
**Monsanto Chemical Co.**

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**The 104-page reprint contains all of the material in the original series: detailed listings of services and publications of the various U. S. and Canadian government departments, state publications, independent trade data sources, also how to classify and interpret chemical market data and other valuable information for persons engaged in market research in the process industries. Use the handy form below to order your copy now.**

**Please send —— copies of "Sources of Information for Industrial Market Research" at $2.50 each. My remittance is enclosed. (Include 5c per copy sales tax for N. Y. City addresses.)**

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**CHEMICAL INDUSTRIES, 522 5th Ave., New York 18**

chine with fewer parts and insure dustless operation.

Capacity of the new mill will vary according to the nature of the material and the fineness of the product desired, ranging as high as 15,000 lb. per hr. and using not more than 10 hp. Overall dimensions of the mill are approximately 5′ long, 4′ wide and 4′ high.

• QB737 As a result of continued research and experiments with war-time equipment, it is now possible to produce *seamless tubes and pipes* in sizes more than double those available before the war, according to The International Nickel Co.

A 4000-ton extrusion press, installed at Inco's Huntington Works during the war and used largely for the production of rotating shell bands, is now producing pipe in nickel, Monel and other high nickel alloys in diameters up to 9¼″ and in lengths up to 12′.

These shapes can be further cold drawn into seamless pipe 8″ in diameter, wall thicknesses up to ¾″, and in varying lengths. Prior to the war, the largest size available in pipe and tubing of nickel and the high nickel alloys was 5″ in diameter.

• QB738 The new *wire mesh membrane* for use in any standard Titeflex filter is a cylinder constructed of Type 316 stainless steel Dutch weave wire cloth, supported on the inside by a 1/16″ thick perforated cylinder with a ring on each end to act as a bearing surface. Mesh of the standard membrane is 20 x 250, but membranes can be furnished in any mesh required. All joints of the membrane are welded.

The new wire mesh membranes can be used with either Filterbestos or diatomaceous earth as filtering mediums, and are interchangeable with the porous stone membranes in Titeflex filters.

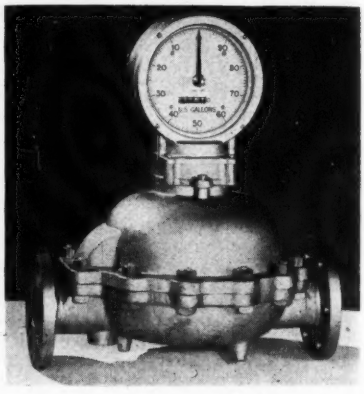
• QB739 The Verticlosed Streamway is a new development in *deep well vertical pump motors* of U. S. Electrical Motors, Inc. It is completely streamlined and the motor has an interchangeable base to permit horsepower change without remachining or exchanging the pump head. A waterproof housing protects vital parts of the motor from injurious weather conditions. Downdraft ventilation prevents re-entry of expelled hot air by blasting the air for approximately five diameters away from the motor.

• QB740 For use in Class I, Group D hazardous locations, The Electric Controller & Mfg. Co. is producing a new *combination starter* (with self-contained disconnect switch) for squirrel-cage, synchronous and wound-rotor motors for 2300 to 4600 volt service.

Known as the Valimitor (volt-ampere-limitor) starter, this new unit provides unlimited short circuit protection. Regardless of the available kva of the power system, a fault current in the motor circuit is limited to 25,000 kva (steady state current). The Type ZHS magnetic contactor, 50,000 kva interrupting capacity, is more than ample to clear the circuit.

These starters are built for motors up to 600 hp at 2300 volts and 4600 volts, 60 cycle service. For 25 cycle power circuits, the maximum rating is 300 hp at 2300 volts and 250 hp at 4600 volts.

• QB741 A new line of stainless steel chemical meters for the *volumetric measurement* of corrosive liquids is now available from the Buffalo Meter Co. Capacities range from 3 to 160 gpm depending on the nature of the liquid. The new units are available in two models, 1″ DV and 2″ GV and are engineered for the measurement of such corrosive



products as caustic soda, most acids, fruit juices, liquid soap, molten sulfur, vinegar and similar liquids when metered free from air under 100° F.

The new chemical meters follow the basic design of Niagara liquid meters but have working parts of type 316 stainless steel. The measuring piston is made of hard carbon or other materials as required. Outer castings are of 316 stainless steel, cast iron, cast bronze, or high-pressure cast carbon steel.

• QB742 Hastelloy and Multimet *alloy drawn wire*—for welding, metal-spraying, and the manufacture of wire screen, wire cloth, and springs—is now available in sizes down to 0.060″ in diameter from Haynes Stellite Co. The wire is furnished in coils or in cut and straightened lengths, either bare or flux-coated. Sizes below 0.060″ in diameter are supplied by an associate company, Kemet Laboratories Co.

• QB743 The improved Allis-Chalmers Utah *electro-magnetic vibrating screen* for sizing any granular material from 10 to 48 mesh (dry) or 65 mesh (wet) features include a pair of rigid rubber mounted steel vibrator bars (one on each side of the screen) replacing flexible reed construction; dust enclosure with quick-opening hinged door for convenient

# up to 45 tons per hour packed in thrifty multiwalls

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Sealed is the word for it! Your chemicals can't sift out of multiwalls that are closed with Bagpakers.® No moisture gets in or out, and the closures are uniformly strong . . . proof against rough handling or dropping.

If you already have efficient filling and weighing equipment, check the "DA" Bagpaker for applying the famous "cushion-stitch" *taped* closure. Or where you want completely automatic operation, get the facts on Model "A". Used with free or semi free-flowing materials, the Model "A" is your central packing point . . . saves labor and give away weights . . . cuts bag costs. Bagpakers handle from 25 to 45 tons per hour—consistently. Talk it over with a nearby Bagpak engineer, or write for proposal.

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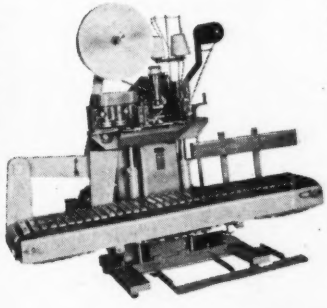
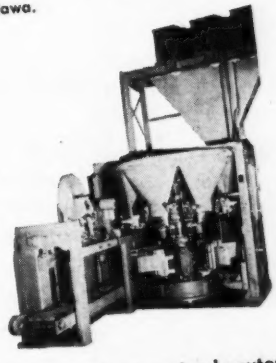
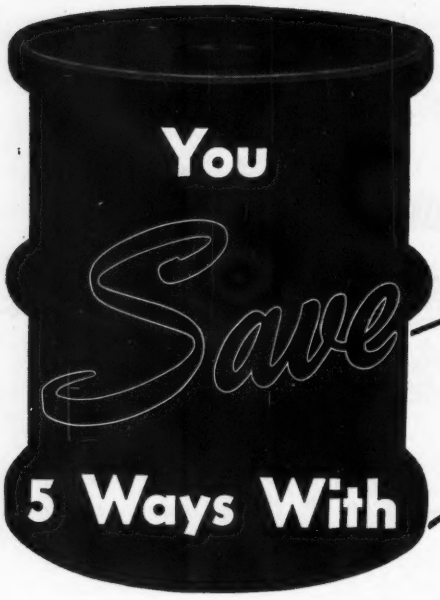


**MODEL "DA"** (portable)—One operator, filling and closing, can handle 2 to 4 100-lb. bags a minute . . . 6 to 12 a minute where filled bags are delivered to BAGPAKER conveyor (quickly adjustable for various bag sizes). Starting and stopping of sewing operation is automatic, no tape wasted.



**MODEL "A"**—Completely automatic —extremely accurate weighing. Saves on "give away" material, labor and bag costs, thus paying for itself quickly. Machine capable of filling and closing 100-lb. bags at the rate of 15 per minute . . . needs one operator.

BAGPAK DIVISION



*Lighter, unbreakable drums can be rolled — handled — stacked faster.*

# GENERAL All-rubber Drums
## *for Corrosive Liquids*

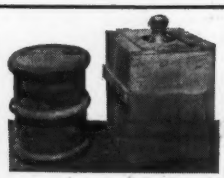
1. **Faster Handling** — drum shape permits faster, easier handling. Light weight rubber drums can be rolled and stacked more quickly by fewer men.
2. **Lower Shipping Costs** — drums (empty) weigh only ½ as much as crated containers — take a lower freight rate.
3. **More Gallons per Shipment** — only 1½ square ft. of floor space is required as compared with 4 square ft. for boxed containers of equal capacity. More drums per carload; hence, more gallons per shipment.
4. **No Storage Problems** — drums can be stacked high, stored indoors or out — contents are never exposed to light.
5. **No Maintenance Costs** — because of flexible all-rubber construction, there is nothing to break or corrode. Damage and loss from breakage and spillage is minimized. Many of these containers have been in acid service for over ten years and are still in use.

### Liquids Handled

Muriatic (Hydrochloric) Acid
Sulphuric Acid—47%
Sulphurous Acid
Phosphoric Acid—85%
Zinc Chloride Solution
Ferric Chloride Solution
Copper Sulphate Solution
Sodium Hypochlorite
Sodium Cyanide
Aluminum Chloride Solution
Ammonium Chloride Solution
Ammonium Sulphate Solution
40% Formaldehyde (Formalin)
Caustic Potash Solution
Acetic Acid
Hydrofluoric Acid— up to 60%
Fluosilicic Acid

ICC 43A approved — may also be used for many unregulated liquids.

COMPARE:



| | Rubber Drum (13-Gal. | Boxed Glass Carboy approx. size) |
|---|---|---|
| Weight empty | 35 lbs. | 70 lbs. |
| Floor space | 1¼ sq. ft. | 4 sq. ft. |
| Height | 20½ in. | 30 in. |
| Units per carload | 500 | 250 |
| Total acid weight per car | 60,000 lbs. | 30,000 lbs. |

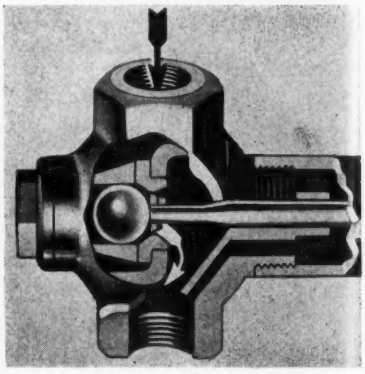
*Sole Distributor*

**Maurice A. Knight** 202 Kelly Ave., Akron 6, Ohio
**Acid and Alkali-proof Chemical Equipment**


inspection of screen surfaces; a power unit with selenium disc rectifiers for finger-tip vibration control, and a new varipulse unit for higher screening efficiency and to minimize blinding at the most efficient amplitude setting.

According to the company, the screen operates on 0.6 to 1.2 kilowatts depending upon the application and frequency of vibration.

• QB744 *A ball type inner valve* designed to give accurate regulation and tight closing is announced by Klipfel Mfg. The new construction appears in all valves of the Klipfel "400" series—for applications which require accurate regulation



of steam, water, air or gas at inlet pressures less than 250 psi., reduced pressures below 150 psi., and where the reduced pressure must be often adjusted.

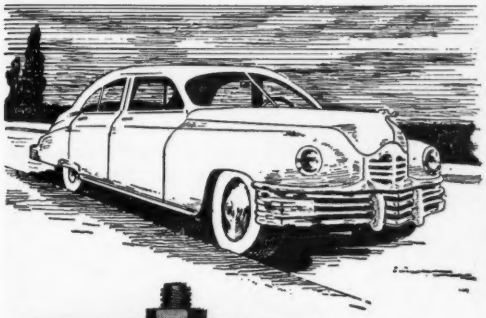
All of the "400" series are single seated with a ball inner valve actuated by a rubber diaphragm. The stainless steel ball centers freely on the seat with uniform contact all around. When off the seat the ball is free to turn so that all parts are exposed in turn to the scouring action of the flow.

• QB745 Bailey Meter Co., has expanded its line of automatic gas analyzers and recorders to include a *thermal-conductivity type gas analyzer*. The analyzer works on the standard principle of thermal-conductivity gas analysis which measures the rate at which heat is conducted by the gas being sampled.

The new analyzer is mounted in an explosion-proof case and is unaffected by voltage variations, ambient temperature, and variations in sample pressure. An all A-C circuit is employed, permitting the use of a standard Bailey electronic recorder.

• QB746 Eastern Industries, Inc., has developed a new *centrifugal pump*, Model H. This unit is for moderate pressures and volumes and runs at 1725 rpm. The performance curve shows a shut-off pressure of 19 psi, 10 gpm at 15 psi, 15 gpm at 10 psi, and in excess of 20 gpm at free flow.

The pump is constructed in either bronze or aluminum, with lifetime me-



1. Is this an au-to-mo-bile?
Yes, this is an au-to-mo-bile.
It is a fine au-to-mo-bile and

# POWELL VALVES

helped to make every part of it.

American Industry has gone a long way since McGuffey compiled his First Reader in 1836. But Powell Valves have matched every step in its progress.

Literally, Powell Valves help to make everything that goes into the modern automobile. Because, whether it be motor, transmission, chassis, body, plastics, finishes, tires, anti-freeze, battery, gasoline or any other processed item, there are Powell Valves exactly suited to control the flow of all media used in their production.

This automobile merely illustrates the completeness of the Powell Line. The important point is that, no matter what *your* product may be, there are Powell Valves especially adapted for each and every one of your flow control services.

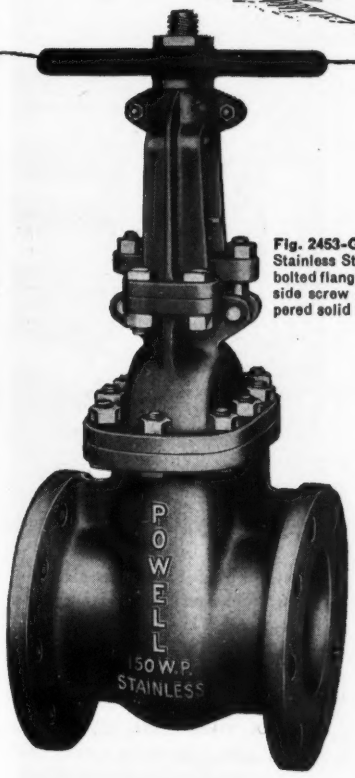



Fig. 2453-G—Large 150-pound Stainless Steel Gate Valve with bolted flanged yoke bonnet, outside screw rising stem and tapered solid wedge.

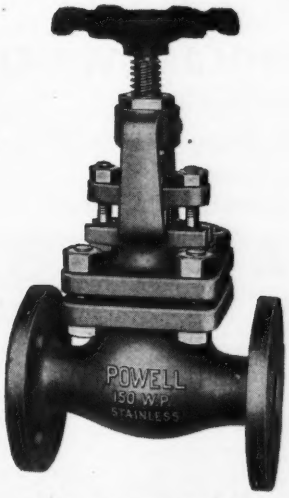



Fig. 1969—150-pound Stainless Steel Gate Valve with flanged ends, outside screw rising stem, bolted flanged yoke-bonnet and tapered solid wedge.

Flush Bottom Tank Valve. Made with disc rising into tank to open valve (Fig. 2309) and with disc lowering into valve (Fig. 2310).

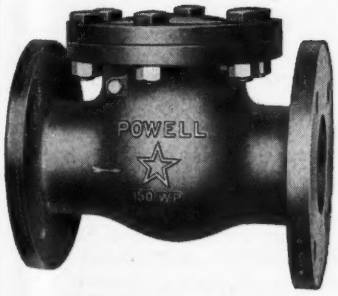



Fig. 2433—150-pound Stainless Steel Swing Check Valve with flanged ends and bolted flanged cap.

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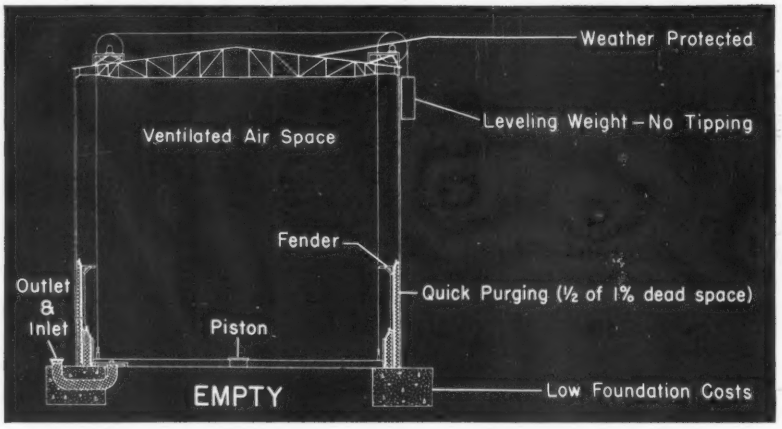
**POWELL VALVES**




# WIGGINS GASHOLDER

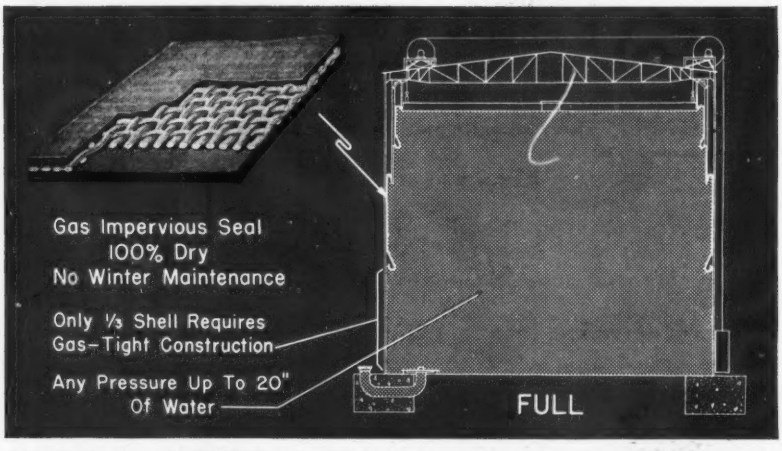
**Designed and built to store chemical process gases such as**

## $CO_2$, CO, $H_2$, N, $CH_4$

**NO OPERATING EXPENSE**
**PRACTICALLY NO MAINTENANCE**
**BECAUSE**

## IT IS THE ONLY GASHOLDER WHICH

1: HAS AN ABSOLUTELY DRY FRICTIONLESS SEAL
2: IS NOT AFFECTED BY HEAT, COLD, ICE, SNOW, WIND OR RAIN
3: DOES NOT ADULTERATE THE GAS
4: HAS LESS THAN ½ OF 1% DEAD SPACE FOR QUICK PURGING

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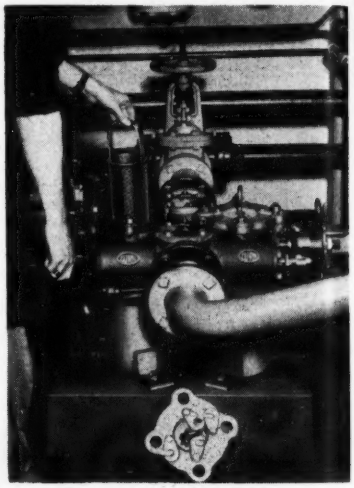
WIGGINS VAPOR SEALS GENERAL AMERICAN TRADE MARK


chanical rotary seal. Units are available with motors ranging from ⅛ hp to ⅓ hp, depending on operating range desired. With ⅛ hp motor, the overall size is 12⅛" long x 7⅜" high x 8¹⁵⁄₁₆" wide and the weight in bronze construction is 37 pounds.

• QB747 A *duplex stainer* has been designed to handle fluids with a high solid content which can be cleaned without interrupting pipe line operation. These units are suitable for intermittent as well as continuous flow and can handle sudden surge of solids. They will be presented by A. Zurn Mfg. Co.



Flow through the unit is diverted from one straining chamber to another by a large, easily operated handwheel without the possibility of any positive shut-off. Covers are removable for lifting out the perforated strainer baskets.

• QB748 Tempil Corp. has developed additional temperature ratings of Tempilstiks° (crayons), Tempilaq° (liquid) and Tempil° pellets to provide a fuller range of these *temperature indicating products*. All three products are now available in 12½-degree intervals from 113° to 450° F. From 400° to 1600° F Tempilstiks and Tempilaq are available in 50° increments while Tempil pellets can be had up to 1700° F.

• QB749 Industrial Filter & Pump Mfg. Co. is introducing a line of *water demineralizers*. Dissolved mineral salts in water are removed by chemical action upon passing water through beds of ion-exchange resins. Units in both two- and four-bed models will deliver up to 1000 gph although special units are designed.

• QB750 The Engineering & Construction Div. of Koppers Co., Inc. can now furnish the Goldman *agitator*. The recently patented Goldman agitator is so constructed that it propels liquid to the sides of the tank and upward. At the top, the liquid is drawn to the center where it is

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**Phenyl Ethyl Alcohol**
**Phenyl Ethyl Acetate**
**Ethyl Phenyl Acetate**
**Benzyl Acetate**
**Benzyl Alcohol**
**Benzyl Benzoate**
**Alpha Amyl Cinnamic Aldehyde**
**Acetophenone**
**Methyl Acetophenone**
**Benzophenone**
**Nerolin**
**Yara Yara**

## COAL TAR CHEMICALS

**Cresylic Acid**
**Tar Acid Oil**
**High Boiling Tar Acids**
**Ortho-Cresol**
**Pyridine**

## FUMIGANTS

**Methyl Formate**
**Ethyl Formate**

## PHARMACEUTICALS and INTERMEDIATES

**Cyanoacetamide**
**Cyanoacetic Acid**
**Ethyl Cyanoacetate**
**Methyl Cyanoacetate**
**Triethyl Orthoformate**
**Phenyl Acetic Acid**
**Phenyl Acetamide**
**Methyl Phenyl Acetate**
**Benzyl Cyanide**
**Phenobarbital**

## PLASTICS CHEMICALS

**Formaldehyde**
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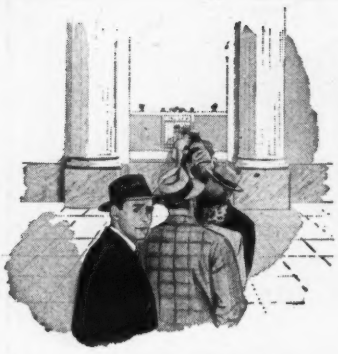

THIS IS HARD

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AND THIS IS MIGHTY WONDERFUL

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But it's mighty hard to make yourself take cash out of your pocket, and time out of your day, to do it *regularly*.

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**1. If you're on a payroll,** sign up in the Payroll Savings Plan, then forget it. From then on the money saves itself—so much per week, or so much per month.

**2. If you're not on a payroll,** sign up at your bank for the Bond-A-Month Plan. Equally easy. You decide how much you want to put into bonds every month, your bank does the rest.

In just ten years after you start buying bonds, your money starts coming back to you—well-fattened! Every $3 you invest today brings you back $4 to make possible all the wonderful things you dream of doing.

**And remember**—any time you need your money for emergencies, you can get it back *in minutes*, without losing interest.

**Automatic saving is sure saving—**

**U.S. Savings Bonds**

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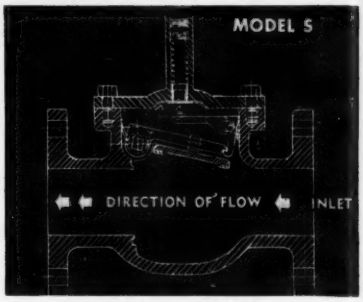
pulled downward through the hollow axis upon which the agitating blades are fastened. It is expelled from the bottom of this hollow axis to repeat the process.

• QB751 New improved models of the Warden *automatic low pressure shut-off valve* of the Security Valve Co., incorporate a precision lapped synthetic




rubber seat which provides for positive closure. They are recommended for use on gas or fluid lines where closure is desired when pressure fails from any cause.

The simple mechanical action is not dependent on external actuating forces, and it must be reset manually after closure.

Valves are set to close at pressure specified by the customer and are available in models for both high and low pressure use in sizes ¾" through 8".

• QB752 A new line of extra-low staritng kva *squirrel cage induction motors* is available from Electric Machinery Mfg. Co. Called design X, new line is available in flange-mounted type and coupled two-bearing type for direct coupling to 514, 600 and 720 rpm air compressors. Line permits full-voltage starting (across-the-line) with a starting kva of only 425% as compared with 550% starting kva of NEMA Design B motor. Full voltage starting is better from the standpoint of power supply and requires simpler, lower cost control equipment.

This line is available as follows:

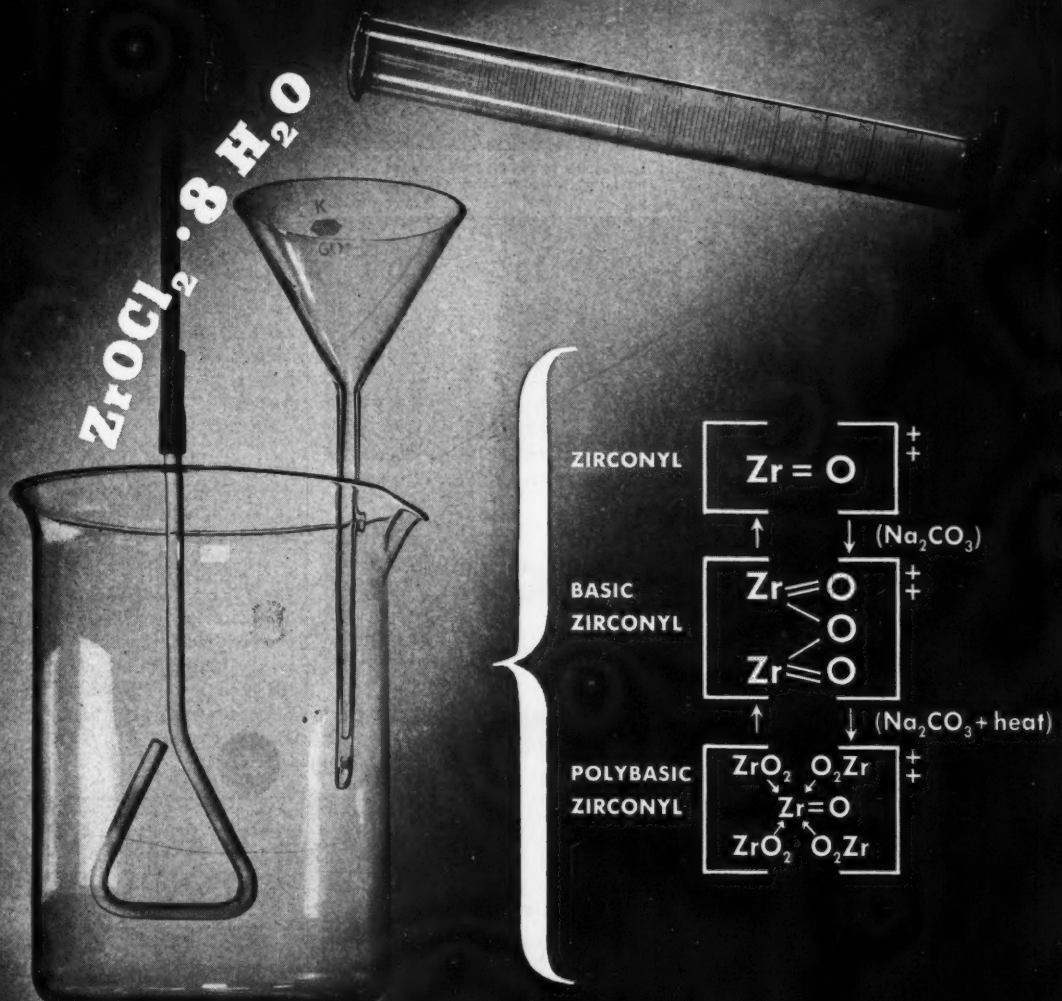
| Horsepower | 60 Cycle Speeds |
|---|---|
| 60 | 600 |
| 75 | 720, 600 |
| 100 | 720, 600 |
| 125 | 600 |
| 150 | 600, 514 |
| 200 | 600, 514 |
| 250 | 514 |

• QB753 The semi-steel Series 430 *combination separtor trap* of Clark Mfg. Co. fills a need for a compact unit to remove entrained moisture and condensate from air supply lines.

The new Series 430 diverts all moisture from air supply to the collecting chamber, where the integral ball float trap automatically discharges it into the drain. Pressure drop through the separator is negligible.

It is furnished in five sizes: ½", ¾", 1", 1¼" and 1½" for working pressures up to 150 psi on the ½" and ¾" sizes

# UNUSUAL IONS WITH USEFUL APPLICATIONS




Upon dissolving zirconium oxychloride in water, a number of ionic individuals is obtained. The preponderance of particular ions can be easily controlled by adjusting the temperature and pH of the solution. This permits a surprising number of physical and chemical properties to be realized from this one zirconium salt. These properties have already been successfully exploited in the preparation of a wide variety of chemical products. Many additional uses are in prospect.

Manufacturers interested in better catalysts, mordants, pigment lakes and toners, leather tanning, pharmaceuticals and numerous other chemical products may obtain detailed information through our New York Office.

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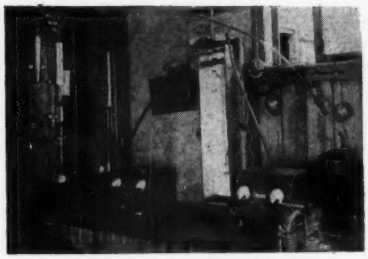
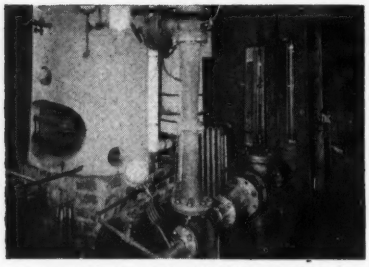
# What's Behind a CR Evactor?

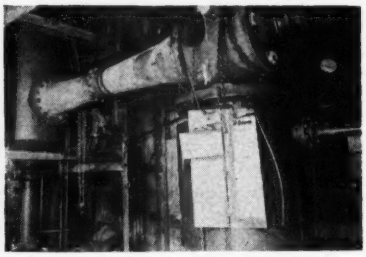
**The production of Evactors is no routine operation at the Croll-Reynolds plant. Although CR engineers have over thirty years of industrial vacuum experience to guide them, the Croll-Reynolds testing and development department is one of the important units of the company. Development work is constantly under way to improve the efficiency of Croll-Reynolds Evactors wherever it is possible. It is this never-ending research and development which give CR Evactors their exceptional efficiency.**



1. Instruments in the CR laboratory set up for measuring extremely high vacuum.



2. Special boiler in the CR pilot plant for providing unusual conditions of high pressure steam or superheat (or both) to duplicate the working conditions in customers' plants.



3. A 30-inch CR Booster Evactor on test in a CR shop.

**CROLL-REYNOLDS CO.**

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CUTS handling costs handling time

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Profits are better when your handling costs can be reduced. Your storage space can be put to more complete use if a Flexoveyor Bag Flattener is a part of your production line. Newly-packed bags handled by the Bag Flattener are made smooth, less bulky, and may be piled more easily in less warehouse space. Flattener is available on skids in the horizontal position for permanent installation as a conveying and flattening element in a production line, or on wheels, for complete portability.

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and up to 200 psi on the 1" and 1¼" and 1½" sizes.

• QB754 A new *stainless steel filter* of the plate and frame type, using filter paper sheets 13¾" square with internal, leak-proof ports, requiring no rubber gaskets is now being produced by Cellulo Co. The plates are fitted with permanent stainless steel backing screens so that any kind or weight of filter papers or asbestos pads may be used as the filtering medium. It replaces the need of filter cloths.

This model is available to accomodate filtering with or without filteraids or for cake building space. This filter is also available in other metals, such as cast iron, aluminum and bronze.

• QB755 Wagner Electric Corp., which has built *drip-proof motors* in frames 225 and smaller for many years, has adopted the same design for its polyphase motors in the 254, 284, 324 and 326 frames.

• QB756 Cresent Truck Co. is now producing 3000 and 4000 pound *electric industrial fork trucks* equipped with pneumatic tires and an "Automatic Self-Loading Scoop" in capacities up to 15 ft.

• QB757 Roy E. Roth Co. is marketing a new line of *medium duty turbine pumps*. They are for handling low-viscosity and non-abrasive fluids against moderate pressures. Capacities are 2-10 gpm and 20-100 head feet in water at 1750 rpm or 2-8 gpm and 100-200 head feet in water at 3450 rpm.

## LABORATORY EQUIPMENT

### *Glass Adapter* LE 112

**New adapter of the Scientific Glass Apparatus Co. permits removal of cuts without use of glass stopcock in contact with distillate.**

The Theimer glass vacuum adapter (pat. pend.) permits removal of a number of cuts or fractions without disturbing the vacuum within the still itself. Until now such an adapter required the manipulation of three or four stopcocks.

The new Theimer-adapter contains no stopcocks, but employs an internal glass valve which is automatically lubricated by the distilling liquid. All manipulation is in a three-way stopcock in the pump system, removed from contact with the distillate. This stopcock also does not require cleaning after each distillation.

In operation the system is evacuated through the adapter and 3-way stopcock. When the receiver is to be removed, the stopcock is turned 90° to admit air into the receiver. The inrushing air automatically closes the valve so that no air

*Another Atlas "First"*

# The HLB System...

## of Selecting Emulsifiers

## *as Easy as One-Two-Three!*

The new Atlas HLB System helps you make quick work of choosing the right emulsifier for *your* job. The system is based on empirical numbers representing the Hydrophile-Lipophile Balance of each emulsifier. Through its use, you can frequently eliminate needless, tedious experiments to determine which of hundreds of emulsifiers to use in your product.

For example: You want to make an O/W emulsion of paraffin. Under the new Atlas system, it's fast and easy. Just three steps:

***One!*** You consult the table on page 21 of the Atlas Surface Active Agents book. You find that the Surface Active Agents used are:

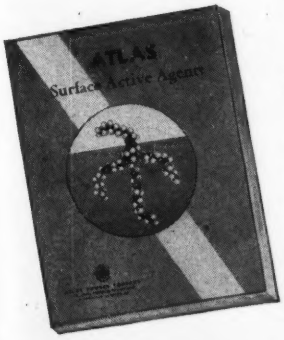
Span 40—Tween 40 Combined
Span 80—Tween 80 Combined
Or other palmitates, stearates, or oleates. *The most favorable HLB: 9-12.*

The HLB of a 50-50 mixture of Span 40 and Tween 40 would be figured like this:

| | *HLB* | | *Proportion* | |
|---|---|---|---|---|
| Span 40 | 6.7 | x | 50% | 3.35 |
| Tween 40 | 15.6 | x | 50% | 7.8 |
| | | | | 11.15 |

Such a mixture is obviously within the favorable range. In the same manner you would find that an 80-20 or 20-80 mixture falls outside the optimum HLB range of 9-12.

***Two!*** You try a series of five preliminary emulsions, using five different ratios of Span 40 to Tween 40 (palmitates). This might be repeated with Span and Tween 60 (stearates); and Span and Tween 80 (oleates). Thus you simply, systematically find the best fatty acid derivation—and the optimum HLB—for *your* job.




***Three!*** You consult the big pull-out insert in the Atlas book which shows at a glance the wide list of Atlas products in the fatty acid class you want, with HLB numbers, solubilities, viscosities, and other general characteristics that relate to your problem. As guides, actual formulas for making emulsions are shown.

The new Atlas HLB System—the first of its kind—is described in detail in Chapter 2 of the Atlas Surface Active Agents book. Other features of this publication include chapters on Surface Active Agents in the manufacture of polishes, paints, cutting oils, insecticides, detergents, and textiles. Seventy formulas for various products make the book a handy reference guide. *Write for your copy on your official stationery.*

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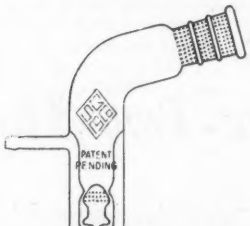
LIMITED

gets into the rest of the system. Distillation continues smoothly although the source of vacuum is temporarily cut off. When the emptied receiver is replaced, the stopcock is returned to its original




position. When the receiver is evacuated to the same pressure as the rest of the system, the valve falls into the open position.

Two models of the Theimer vacuum adapter are available in a variety of sizes of standard taper or semi-ball connections. One model, with a jacket around the valve, is used for circulation of coolant when distilling extremely limpid materials or of warm liquid with viscous materials. The other model, without jacket, is satisfactory for normal distillates and costs less.

• LE113 Pfaltz and Bauer, Inc., are producing a new "Sartorious-Type" *projection balance.*

This instrument incorporates such features as weight application by remote control and direct reading projection scale to the fourth decimal. In addition, uniform damping is achieved through air compression. Troublesome rider adjustments are eliminated and weighing time is greatly reduced.

• LE114 The Speed *Oven* of the Harry W. Dietert Co., has a drying space of 8″ in diameter and 6″ in height. The overall height of this new laboratory dryer is 29″. Power requirements are 2800 watts at 115 or 230 volts. A motor driven fan forces filtered air past electric heating elements, thermostatically controlled to maintain any chosen drying temperature from 150 to 350° F.

• LE115 The Nylab Vac-U-Mat is a new *aid to vacuum filtration* designed by the New York Laboratory Supply Co. It prevents spilled filtrates, breakage, and eliminates cumbersome clamping.

The Vac-U-Mat consists of a flat circular rubber mat 5″ in diameter and ¾″ thick, with a cylindrical hollow on the underside which serves as a vacuum chamber and which communicates with the upper surface through an orifice. Two brass tubulatures for 3/16″ to ¼″ rubber tubing on the side connect the vacuum chamber with the vacuum line.

The Vac-U-Mat holds all standord filtering flasks from 25ml. to 1000ml.

• LE116 Eastern Industries is now producing a new, *heavy duty laboratory stirrer* for use with thick, viscous preparations. It is claimed to stir from 1 to 10 gallons of heavy fluid, much larger quantities of thin mixtures.

The #8 is powered by 1/15 hp GE universal open frame motor for continuous duty A.C. or D.C., 110 volts only. Maximum countershaft speed of 840 rpm is produced—a permanently installed rheostat type speed control permits variable speeds from 80 to 840 rpm.

The ½″ propeller shaft can be adjusted to length within a 30″ range by means of a hollow gear shaft and a collet chuch at the top of the gear case. Attached to this shaft is a two-blade, stamped stainless steel propeller 5½″ in diameter, held in place by a stainless steel cap unit.


# Suction Filters

## FOR ACIDS AND CORROSIVE LIQUIDS

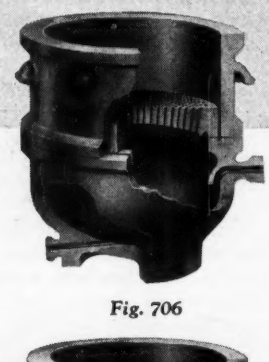


Fig. 706

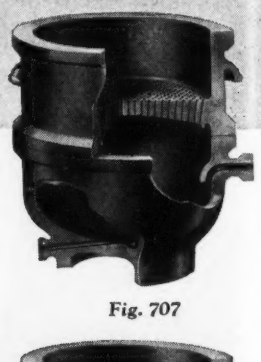


Fig. 707

"U.S." chemical stoneware suction filters are corrosion-proof all the way through. Extra tough, extra strong, they will handle a complete vacuum. The dense, non-porous body will not absorb odors. Smoothly-rounded contours make cleaning easy.

"U.S." Suction Filters are made in five types in a wide range of sizes.

*Fig. 706*—Two-Piece Filter with Removable Support Plate.

*Fig. 707*—Two-Piece Filter with Support Plate an integral part of upper section.

*Fig. 708*—One-Piece Filter with Removable Support Plate.

*Fig. 709*—Three-Piece Sectional Unit Filter. Available with conventional support plate or with "Filterstone" Porous Plate. "Filterstone" Plates may be used alone as the filtering media or in conjunction with other media.

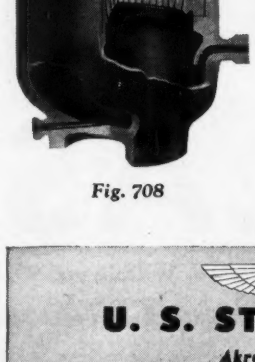


Fig. 708

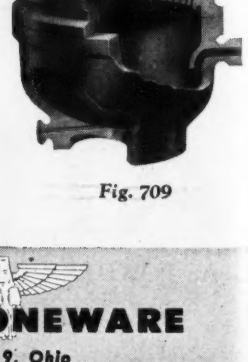


Fig. 709

*Write for our Catalog showing detailed specifications on our complete line of filters.*

**U. S. STONEWARE**

*Akron 9, Ohio*

# SOLVENT VAPOR DRYING PROCESS DRIES WOOD IN HOURS WITHOUT DETERIORATING EFFECTS

Heretofore wood has been dried in open air, by steam, or by high temperature air. Open air drying takes 6 to 18 months; steam and high temperature air often result in hydrolysis or burning. Now, one of the country's largest wood preserving plants has developed a Vapor Drying process which safely and effectively dries wood in from *6 to 14 hours!* The drying agent used is *Esso's Solvesso Xylol.*

The drying process begins when a locomotive pushes a charge of crossties, approximately 100 feet long, into a cylinder or drying chamber. At the proper time, vaporized Solvesso Xylol is passed into the drying cylinder. The hot Solvesso Xylol vapor is circulated through the cylinder for a few hours, penetrating many inches into the wood and evaporating much of its moisture.

As "dry cleaning" and moisture evaporation continue, the solvent vapor with its moisture-lignin content leaves the cylinder and is condensed, separating the solvent from the water in the settling tank and returning the Solvesso Xylol to the evaporator to be reused. (see diagram)

## *5 Gallons of Water from One Crosstie*

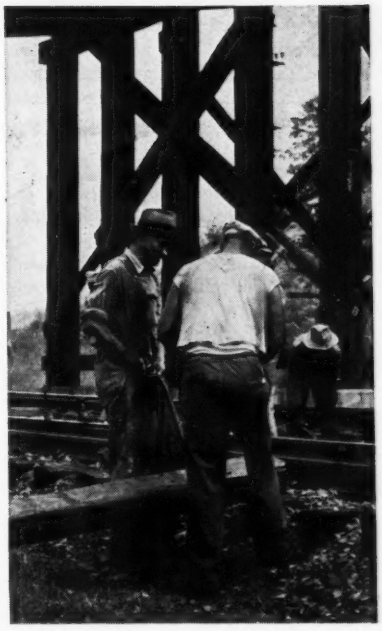
The amount of water removed from the settling tank determines the relative dryness of the wood being treated. When drying is finished, the Solvesso Xylol lines are closed, the chamber evacuated and the wood is ready for treatment with wood preservative. Water from the settling tank is passed through a meter, which is read periodically to determine wood drying progress. One charge of 800 crossties may be made to give up as many as 4,000 gallons of water—or *5 gallons per crosstie*—in a 12-hour drying period.

## *Esso Solvents Play Vital Role in Scores of Industries*

Rubber, textiles, chemicals, paper, food, leather and scores of other industries are utilizing the many types and grades of solvents manufactured by Esso Standard Oil. Production men know they can rely on Esso Petroleum Solvents' purity and uniformity, maintained through most modern and stringent refinery treatment. If you have a solvents problem, let our technical men examine your requirements and determine the solvent best suited to your needs. Drop a line today to our office nearest you.

## Paper Mill Machinery now Cleaned with Solvesso 100

Solvesso 100 is now being used to clean paper machine screens and felts when they become congested with natural wood pulp gums and resins. Since paper machines are operated at extremely high temperatures, Solvesso 100's high flash point (over 100°F.) makes it ideally suited. In addition, Solvesso 100 has especially high solvency for resins since it contains more than *95% petroleum aromatics.*



Before they were creosoted, the crossties in this picture were dried by a new vapor process employing Solvesso Xylol.

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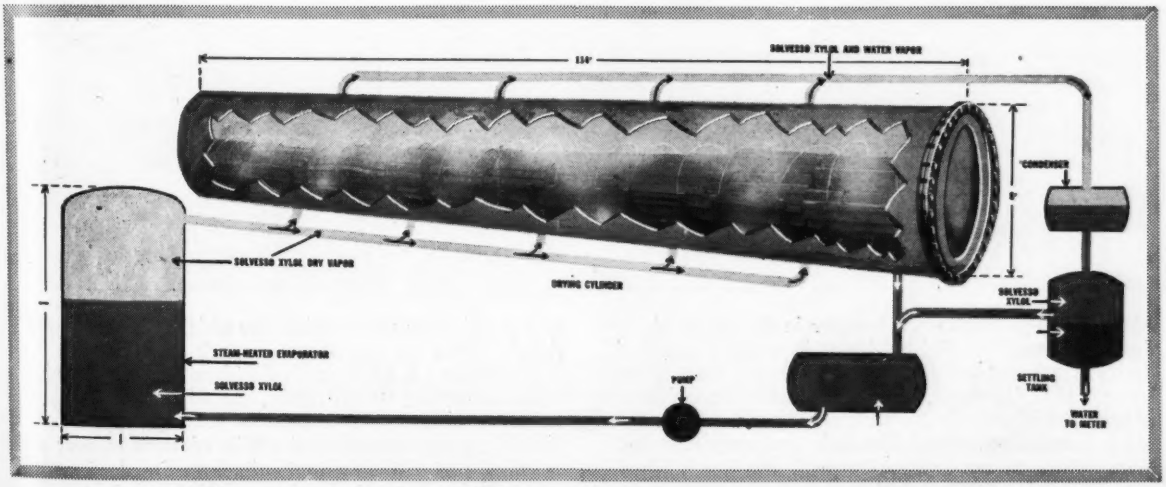
**ESSO STANDARD OIL COMPANY OF PENNSYLVANIA**—Philadelphia, Pa.




This diagram shows how Solvesso Xylol is being used in new vapor drying process for drying crossties.

# PACKAGING & SHIPPING

*by T. PAT CALLAHAN*

## *St. Regis Tacoma Mill Starts Production*

St. Regis Paper Co.'s new kraft paper mill at Tacoma, Washington, has begun production. This just about completes the current phase of the company's broad program of integration, modernization and expansion.

Part of the pulp manufactured by St. Regis at its Tacoma sulphate pulp mill will now be converted into paper at Tacoma and then into multiwall paper bags in the company's western factories, to meet the mounting industrial packaging needs of the Pacific Coast. To round out the integration, the company has acquired substantial timber resources in the Northwestern area during the past several years.

Begun late in 1947, the new kraft paper mill at Tacoma houses a Pusey & Jones Fourdrinier paper machine designed to produce multiwall kraft paper 168 inches wide at a rate of 2100 feet per minute. This represents a capacity of 240 tons a day of this type of paper.

Heretofore, the sulphate pulp of the company's Tacoma pulp mill had been sold as market pulp or converted at other kraft paper mills of the company. With the completion of the new paper mill, part of the pulp will be converted at Tacoma, with the balance still available for the company's pulp customers.

## *Styrene Undergoes Climatic Test*

Twelve drums of styrene, the product of Monsanto Chemical Co.'s Texas City, Tex., plant have been shipped from Houston bound for nowhere in particular and consigned to nobody at all.

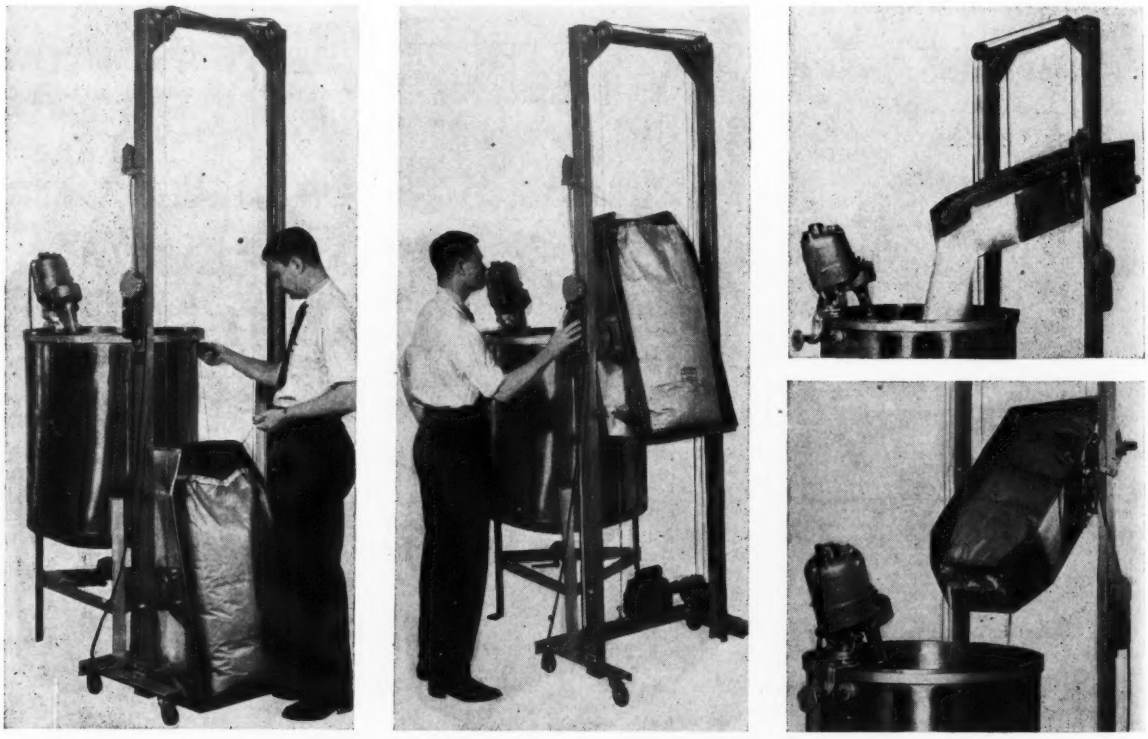
The shipment had a round-trip ticket on the SS Tulane Victory bound for South American ports. Monsanto is sending the chemical on a leisurely cruise to determine how styrene will stand up under climatic conditions at sea. Six of the drums were stowed on deck, and six were placed in the hold.

Styrene is a raw material used in the manufacture of plastics as well as an ingredient of synthetic rubber and some types of paint.

## *New Manual on Package Sealing*

The Gummed Industries Association, Inc., has published a manual, "What Every Shipper Should Know About Proper Package Sealing." This manual describes the proper way to apply gummed sealing tape to shipping cartons, telescope cartons, soft packages, irregularly shaped packages, carry-home packages, and fragile and difficult packages. There are also sections on the importance of using modern sealing tape dispensing machines, proper moistening of tape, getting best results from a sealing tape dispenser,

## *New Machine Lifts and Empties Bags with Finger-Tip Control*



**Along with the tremendous increase in the chemical industry's demand for multiwall bags have come improved devices for lifting and emptying filled bags. One of the latest is the "Upanover," manufactured by Jacob House & Sons, Buffalo, N. Y. As pictured in action above, the bag is eased in upright at floor level and opened (left). With a flick of the switch (center), the bag is lifted smoothly in the stainless steel carrier which automatically tips and pours at the height for which it is set (upper right). Since the bag is held securely while it pours, it does not slip. A quick shake dislodges the last particles in the empty bag (lower right), and another flick of the switch returns carrier to floor level. The Upanover is portable, pours smoothly and can be adjusted to pour all or only a part of the contents of a bag. Standard model serves tanks up to 6'; special models, any height tank.**

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- That's why we think it's such sound business for you to check with Continental before making any decision affecting your supply of cans.
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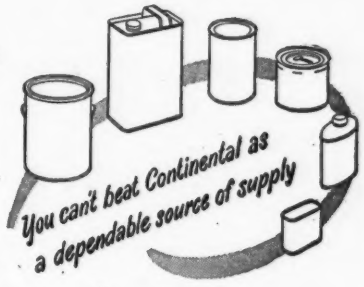


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specifying correct basis weights and widths of sealing tape, proper storage of tape, and "padlocking" packages with printed sealing tape.

Other features are answers to a few unusual questions about the proper use of gummed sealing tape, and a quick review of current Carrier and Postal Regulations.

### *Polyethylene Liner for Multiwall Bags*

**One of the special linings being used for multiwall bags is polyethylene, which is bacteria-resistant, moisture-proof, pliable, and does not stiffen and crack with age. Here the liner keeps peat humus in its natural state ready for use, and prevents its causing decomposition of the outer bag.**

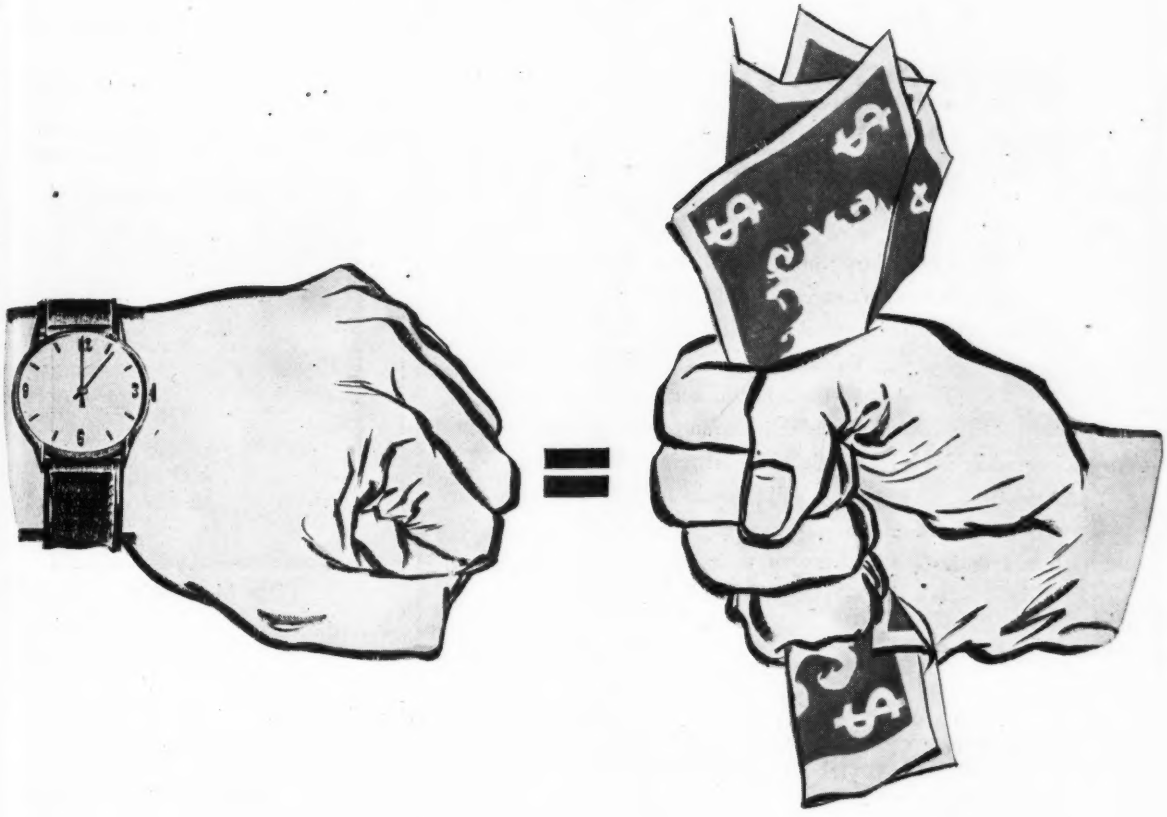
### *Changes in Regulations For Bulk Shipment of HCl*

A notice regarding proposed changes in the regulations for transportation of hydrochloric acid in bulk was published in the "Federal Register" dated August 11, 1948 (13 F. R. 4638), and a public hearing was held by the Merchant Marine Council on September 28, 1948, at Washington, D. C.

The purpose of this amendment to the regulations is to effect editorial changes and to permit certain practices to be employed by the industry in the construction or repair of tanks designed to carry hydrochloric acid in bulk, eliminate the requirements for radiographic and stress relief tests in the construction of tanks used in the transportation of hydrochloric acid in bulk, and to further change the regulations so that consistent practices in the construction of containers for the transportation of commercial acids in bulk will be allowed.

The regulations for the transportation, storage, and construction of containers for shipment of hydrochloric acid on board vessels were amended effective November 17, 1948. Particular amendments may be found in the regulations of the U. S. Coast Guard for the transportation and storage of explosives and other dangerous articles on board vessels, section 146.23-13.

This amendment contains present requirements and anyone interested in the



# Have you found this out about Time?

**Executives have** discovered something about Time.

They've discovered that, even in these days of atomic theory and super-mathematics, the old formula is still the same: *Time* equals *Money*.

That's why executives who consider the time-factor as a profit-factor put their products in faster-filling, easier-closing metal containers.

**AMERICAN CAN COMPANY**

**New York · Chicago · San Francisco**

*This trademark* CANCO *is your assurance of quality containers. Look for it!*

**Other advantages of the can**

1. **Cans are break-proof.**
2. **Cans protect contents against light, air, insects, and moisture.**
3. **Cans are *light*—mean lower shipping costs. *Compact*—mean more storage and display space.**
4. **Cans mean eye-appeal for impulse buying.**
5. **Cans are tamper-proof.**
6. **Cans are easy to open and dispose of.**

# WE'VE DONE IT FOR EMBALMERS . . . . .

THERE are odors worse than that of formaldehyde . . . but you wouldn't care to smell them! Nor did embalmers really enjoy working with their formaldehyde solution-embalming fluids before FRITZSCHE chemists found a way to mask their harsh, acrid odors. Now, thanks to a remarkably effective group of odor neutralizers developed in our laboratories especially for formaldehyde odor-control, and known to the trade as ALDAROMES, embalmers can go about their accustomed duties without any of their former discomfort. Which suggests that—having done this for embalmers—

# PERHAPS WE CAN DO IT FOR YOU!

Yours may not be as serious a problem as the embalmer's, but it may be a source of annoyance or inconvenience just the same. For that reason it might pay you to consult our Technical Perfume Division whose special function is to find an economical answer to your industrial odor problem. Chances are we can supply from stock an efficient, time-tested modifier that will quickly solve the odor problem now confronting you. Why not write us in detail and let us try?

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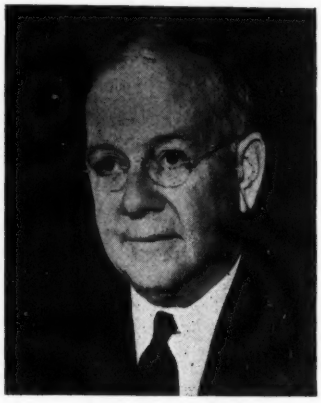
transportation of hydrochloric acid in bulk by water must be guided by this amendment to the regulations.

## *Heekin Elected President Of Can Manufacturers*

The Can Manufacturers Institute has elected Dan M. Heekin president of the organization for 1949. Mr. Heekin, president of the Heekin Can Co., Cincinnati,



**Dan M. Heekin**

will return to the office he previously held as president of the Institute when it was first established in 1938.

Mr. Heekin has been connected with the can industry for 38 years, last year becoming president of the company his father founded. He will replace Robert S. Solinsky, president of Cans, Inc., Chicago, who headed the Institute last year.

The Can Manufacturers Institute has re-elected the following officers for next year: H. Ferris White, executive vice-president, Clifford E. Sifton, secretary and treasurer. Harold H. Jaeger will continue as advertising director for the Institute.

## *New MCA Data Sheet*

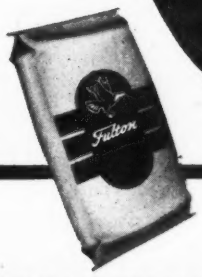
The Manufacturing Chemists' Association has published Chemical Safety Data Sheet SD-27 on Phosphorus Trichloride, the 27th in the series of chemical product safety manuals prepared by them. Designed for supervisory staffs and managements, the manuals concisely present essential information for the safe handling and use of chemical products.

The manual on phosphorus trichloride sets forth clearly the important physical and chemical properties of the product: its usual shipping containers and methods for their unloading and emptying; container storage and handling, and recommended personal protective equipment. Health Hazards and Their Control are covered authoritatively in a section prepared by the Medical Advisory Committee of the Association.

Chemical Safety Data Sheet SD-27, Phosphorus Trichloride, may be obtained at 20 cents per copy from the Manufacturing Chemists' Association, 246 Wood-

# Dress Up Your New Baby

*Call for Fulton!*

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**...the Bag that Goes Every Place**

Hundreds of products go to market in Fulton Multiwall paper bags. Fulton Multiwalls find new uses almost every day . . . keep a host of old users sending their products to market in a container that is both safe and economical.

Creped outside wall, whenever desired, makes for even easier handling and storage. Sewn or pasted bottoms, valve or open-mouth bags give you your choice of the kind of Multiwall to fit your present sacking equipment. Prompt service from our new modern plant in New Orleans.

**All Eyes Are On The Newcomer When He's Dressed By An Old Hand At Winning Baby Shows**

Your pride and joy, the new product you're planning to take to market, must be dressed well. For people to take it in their arms and want it for themselves, it must be dressed to catch their eyes and hold their favor.

Fulton has been coaching proud product parents to win blue-ribbon shows for over 78 years. Fulton *know-how* and Fulton *show-how* helps your bag catch and hold the eyes of consumers . . . helps sell your product and your trade name at one glance.

***To tell a quality story with a quality package..Call for Fulton***

**FULTON BAG & COTTON MILLS**

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**CONVERSION POTENTIAL** includes the manufacture of fertilizers; wood pulp and paper products; textile and textile products; large and small industrial operations for chemicals and chemical products; plastics; processing; packing and storage of foods, beverages, and tobacco and their products; building materials and furniture; metal and alloy products; electrical appliances and accessories; electronic equipment and parts; packaging and assembly line products.

**LOCAL LABOR** is available at all sites.

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**CONSTRUCTION** varies from "permanent", with brick or reinforced concrete and steel to "temporary", with skeleton steel and wood construction and masonite or wood walls. Floors fit specific requirements. Ceiling clearances range from 8' to 30'. Floor spaces are from 10,000 to 110,000 sq. ft.

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ward Building, Washington 5, D. C. Remittance should be sent with each order.

### *All-Aluminum Conveyor for Package Handling*

Designed to provide increased flexibility in package handling, a new, all-aluminum package conveyor has just been developed by George Haiss Manufacturing Co., Inc., New York.

The new conveyor is Haiss Model 485-A, which will handle bags, bundles, boxes, crates, cartons, cases, etc., weighing up to 500 pounds at the rate of 30 per minute. Its major advantage is its light weight which enables it to be lifted by two men or carried by three men.

An exclusive feature which makes the new conveyor suitable for package handling "teams" is its readily detachable coupler unit of tough aluminum alloy. Any number of these conveyors can be combined easily into radially coupled units which carry packages speedily in a straight line, around corners, over piles or obstructions, or onto elevating conveyors.

Other new features which add to the handling efficiency of this new model are a radial roller on the coupler, assuring proper transfer from one conveyor to another; location of belt take-up in the center of the conveyor; detachable caster units; and rubber pulley lagging which is easily replaceable without removing the pulley from the conveyor.

### *Dry Cargo Barges Promise Fast Chemicals Shipping*

Butcher-Arthur Inc.'s fleet of six 240-foot articulated barges will mean high speed transportation of dry bulk cargo in two-barge towing units for the Mississippi River system. The first unit has just been delivered by Dravo Corp. at its Neville Island, Penn. shipyard, with the remaining two scheduled for early completion.

Although barges of this size have been common in the inland river oil trade, these new articulated units are the first to be specifically designed for the movement of dry cargo. They will operate between the Gulf Coast and the mid-continent area, moving sulfur, salt and other chemicals. The vessels are built with special provisions for transportating automobiles on return trips down river.

The six barges will make up three integrated two-barge tows. Each vessel has a sweeping 50-foot long bow, with toed-in corners, and a square stern. While being pushed by a fast towboat, the square ends of two barges will be butted to form, in effect, a single barge 480 ft. long. Their design not only permits fast towing speeds but minimizes towing resistance.

## IT'S EASY WITH POTDEVIN LABELERS

You need never worry about package changes with Potdevins in your packaging department. Potdevins handle any size or shape of container, any style of label. Short runs at short notice—special packages for special occasions—experimental jobs, all go through as smoothly as your regular labeling operation.

And Potdevins are quick and clean. A beginner with a Potdevin applies 30% more labels than an experienced brush worker. She does a neater job because Potdevin's controlled glue film leaves no excess to soil package or label.

***Ask about our free trial offer. Use the coupon.***

We would like a ☐ 6 inch ☐ 8½ inch ☐ 12 inch ☐ 18 inch Potdevin label paster for ten days free trial in our plant.

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COMPANY.....

STREET.....

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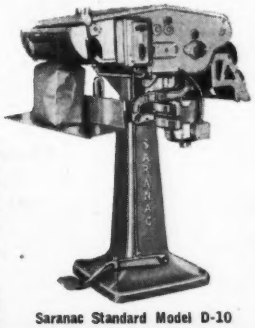
## EVERY CLOSURE IS SIFTPROOF

*when sealed on the D-10"*

**Paper bags can be securely, economically, almost hermetically sealed on the Saranac Model D-10" Standard Bag Sealer. Folding and stapling operations are automatically performed at a single stroke. The resultant stapled fold is the strongest part of the bag—and it's siftproof.**

**Bulletin 154 contains detailed information about bag sealing machines and about our inexpensive licensing plan.**



Saranac Standard Model D-10

**SARANAC MACHINE CO.**
BENTON HARBOR, MICHIGAN

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## LOOK WHAT'S HAPPENING on the Texas Coast

### ALCOA PICKS TEXAS

**Construction is under way for the $10 million first unit of Aluminum Company of America's new plant at Point Comfort near Port Lavaca, Texas. Complete project is expected to total $25 million. The new plant will be completed late in '49, and when in full production, will turn out some 75 million pounds of pig aluminum a year. Mobile and East St. Louis will furnish the bauxite; Texas natural gas will furnish the fuel for Alcoa's high-temperature conversion process.**

☆ ☆ ☆

### DUPONT HEADS SOUTHWESTWARD AGAIN

**The du Pont Company of Wilmington, Delaware, is working on plans for their new multi-million dollar plant to be built on a 1700-acre site near Victoria, in the Guadalupe River Valley of Texas. New plant will produce chemicals and will ship them to other du Pont subsidiaries in Texas and on the East Coast.**

☆ ☆ ☆

### TALL TALE - BUT TRUE

**In 1936 a hunter on the million-acre King Ranch parked his car while hunting white-wing doves. As he walked away, he neglected to take bearings. Later, he couldn't find his car. For a week, searchers beat the mesquite looking for the lost car. Payoff came last November when workers clearing the land found the car exactly where it had been left 12 years before. The radio was still usable.**

☆ ☆ ☆

### CHEMICALS, UNLIMITED

**Today's chemical industry is founded on these indispensable, basic materials —acids, bases, hydrocarbons and fresh water. The Texas Gulf Coast has all four in virtually unlimited quantities: acids from sulphur and salts, bases from salt, hydrocarbons from petroleum and natural gas, and water from rivers and wells. These are reasons why 75 chemical industries have built on the Texas Coast since 1940: reasons why your industry can profitably FOLLOW THE TREND TO TEXAS.**

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**To help you find out more about the area we serve, we will gladly: a, make a survey engineered to your company's needs: b, supply you with any special information you require; c, show you the coast country from Orange to Corpus Christi — all in strictest confidence. Write, wire or telephone. Address: Houston Pipe Line Co., Houston, Texas.**

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# PLANT OPERATIONS NOTEBOOK

## *Safety Films*

According to the National Safety Council, a new series of six sound slide films, "Personal Factors in Safety," for use in training foremen, is now available. The films can be shown as a series or used separately. Each deals with one aspect of the complex problem of handling people.

Taken as a series, the films show foremen how to train new workers, how to keep experienced workers alert, and how to earn the respect and cooperation of all employees. This training course is designed to make foremen better safety supervisors, to increase production, and to improve employee morale.

The films are: No. 1, "The Secret of Supervision"; No. 2, "Teaching Safety on the Job"; No. 3, "People Are All Alike"; No. 4, "People Are Different"; No. 5, "Teamwork for Safety"; No. 6, "Safety Case Histories."

Information concerning these films can be obtained from the Council's membership department, 20 N. Wacker Drive, Chicago 6, Ill.

## NOMOGRAPH-OF-THE-MONTH

Edited by DALE S. DAVIS

***Readers are invited to submit for publication in this department any original nomographs pertaining to chemistry or engineering. $10 will be paid for each one used.***

# *Nomographs for Chemical Kinetics—II*


**by MELVIN NORD**
**Wayne University,**
**Detroit Mich.**


***Constant-Volume, Irreversible, Second-Order Reactions with Two Reactants***

THE simplest type of second-order reaction, i.e., where there is a single reactant, has already been considered; Figure 2 of the previous paper[8] represents the solution for that case. Second-order, irreversible reactions at constant volume where there are two reactants are represented by the expression:

$$A + B \longrightarrow \nu R \qquad (17)$$

In this case the rate equation is

$$-\frac{dC_A}{d\theta} = kC_AC_B \qquad (18)$$

Note that

$$C_A = C_{A_o} - x \qquad (19)$$
$$\text{and } C_B = C_{B_o} - x$$

where x is the number of moles of A or B reacted per unit volume. Substitution of Equation 19 in Equation 18 and integration between the limits of o and x and of o and $\theta$ yields

$$\frac{k(C_{A_o} - C_{B_o})\,\theta}{2.303} = \log \frac{C_{B_o}(C_{A_o} - x)}{C_{A_o}(C_{B_o} - x)} \qquad (20)$$

where $C_{A_o}$ does not equal $C_{B_o}$

Now let

$$\epsilon_A = \frac{x}{C_{A_o}} \qquad \epsilon_B = \frac{x}{C_{B_o}} \qquad (21)$$

where $\epsilon_A$ and $\epsilon_B$ are the fractional conversions of A and B, respectively. Then,

$$\frac{k(C_{A_o} - C_{B_o})}{2.303}\,\theta = \log (1 - \epsilon_A) - \log (1 - \epsilon_B) \qquad (22)$$

Figure 4 is a nomographic solution of Equation 22. To use this nomograph, connect corresponding points on the $\epsilon_A$ and $\epsilon_B$ scales and thus determine a point on the central pivot axis. Connect this value with the corresponding point on the $\theta$ scale and thus determine a point on the scale marked $\frac{k(C_{A_o} - C_{B_o})}{2.303}$. If the reaction is of the type represented by Equaton 17, all intersections on this scale will coincide. Calculate the reaction rate constant k from the value of $\frac{k(C_{A_o} - C_{B_o})}{2.303}$ and the values of $C_{A_o}$ and $C_{B_o}$. The nomograph is constructed on the basis that A is the component present in the larger amount.

As an example of the use of Figure 4, assume that the values of $C_{A_o}$ and $C_{B_o}$ are 1.00 and 0.50 mole per liter, respectively, and that when $\theta = 2.39$, $x = 0.40$ mole per liter, so that $\epsilon_A = 0.40$ and $\epsilon_B = 0.80$. Connect the points that correspond to the last two values and locate a point on the central pivot axis.

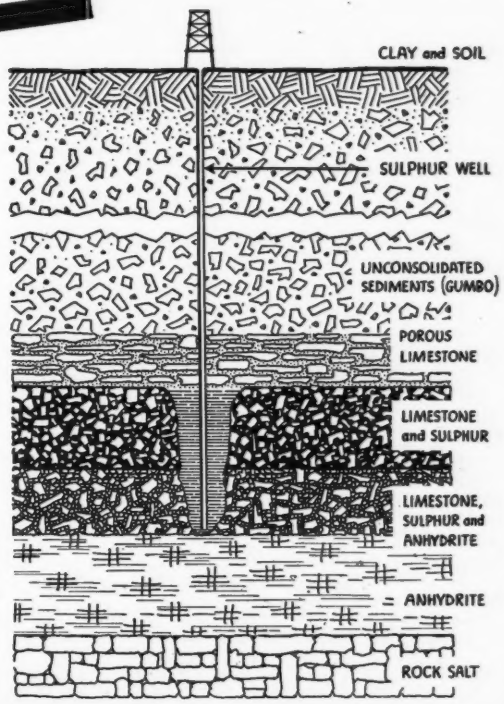
# SULPHUR

## *Interesting Facts Concerning This Basic Raw Material from the Gulf Coast Region

### *DEPOSITS . . .

**Practically all of the elemental sulphur used in this country comes from mines in Louisiana and Texas.**

**There, the sulphur deposits occur in the cap rock overlying certain salt domes. The sulphur is mined at depths of 300 to 2,000 feet below the surface. It is melted in place by pumping into the deposit water heated under pressure to a temperature above the melting point of sulphur. The melted sulphur flows away from the limestone and is pumped to the surface where it is allowed to solidify in vats. By such means sulphur nearly 100% pure is produced.**

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Connect the point so found with 2.39 on the $\theta$ scale, and note that

$$\frac{k(C_{A_o} - C_{B_o})}{2.303} = 0.20.$$

Similarly, when $\theta = 3.70$, $x = 0.45$, $\epsilon_A = 0.45$ and $\epsilon_B = 0.90$. Connect the points that correspond to the last two values and determine another point on the pivot axis. Connect this point with 3.70 on the $\theta$ scale and note that $\frac{k(C_{A_o} - C_{B_o})}{2.303} = 0.20$ again. This agreement indicates that the reaction is of the type of Equation 17. The value of k, calculated from the equation

$$\frac{k(1.00 - 0.50)}{2.303} = 0.20, \text{ is } 0.92$$

Any convenient unit of time may be employed since none are specified. The units of k will depend on those of time and concentration.

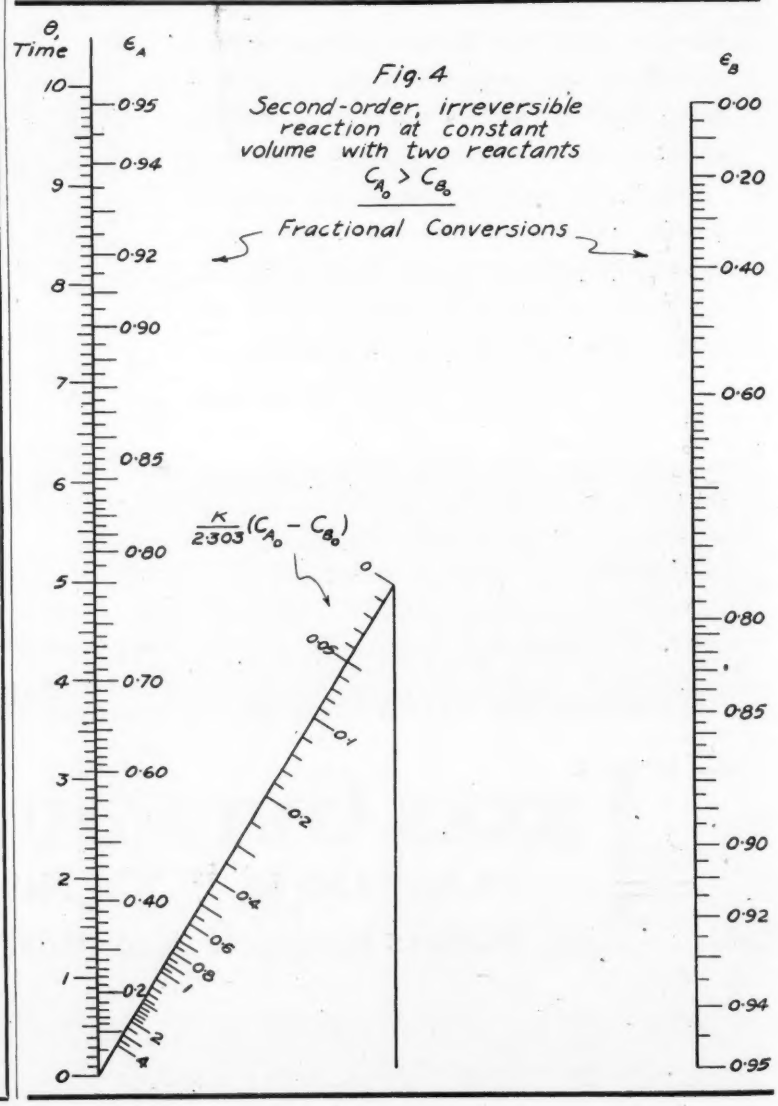
It should be noted that if $C_{A_o} = C_{B_o}$, Equation 20 is inapplicable. In this case, Equation 18 reduces to the equation for a second-order reaction with a single component, and Figure 2 therefore applies instead of Figure 4.

### Nomenclature

- $C_A$ = molal concentration of component A at time $\theta$
- $C_{A_o}$ = initial concentration of component A
- $k$ = specific reaction rate constant
- $x$ = number of moles of a given component reacted per unit volume at time $\theta$
- $\epsilon$ = fractional conversion
- $\theta$ = time
- $\nu R$ = any products of an irreversible reaction

### Literature Cited


[1] Hougen and Watson "Chemical Process Principles," Part III, p. 824 (1947), John Wiley and Sons, Inc.
[3] Nord, Melvin, Chem. Ind. *63*, 666 (1948).

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# LABORATORY NOTEBOOK

## *A Simple Method for Identifying Neoprene*

Frequently, in the laboratory and also in plants, articles of neoprene such as stoppers and tubing become mixed with similar articles made from natural or synthetic rubber. Since these materials have different specific uses, an easy means of separation is desirable. Neoprene can be identified by a simple test.

This is possible by holding a piece of fairly heavy copper wire in a non-luminous flame until none of the green flame color of copper is visible. Then rub the hot wire over the rubber article to be identified until the rubber softens and some adheres to the wire. Put the wire in the flame and reheat. If the material is neoprene, the brilliant green flame color of copper appears. If it is natural or synthetic rubber there is no copper flame color.

This test will of course be readily recognized as an application of the old familiar Beilstein test to rubbers.

## *Hydrocarbons*

The most recent additions to the series of NBS standard samples of hydrocarbons have been announced by the Bureau of Standards as follows: (Each 5-ml.[c] sample costs $35.00.)

| *NBS sample Number*[a] | *Compound* | *Amount of Impurity*[b] *mole percent* |
|---|---|---|
| 535-5S | 3-Methyl-trans-2-pentene | 0.14±0.09 |
| 536-5S | 4-Methyl-cis-2-pentene | 0.25±0.07 |
| 558-5S | 2, 3-Pentadiene | 0.15±0.07[d] |
| 559-5S | n-Dodecane | 0.031±0.025 |
| 560-5S | 1-Methyl-3-isopropyl-benzene | 0.064±0.038 |
| 561-5S | trans-Decahydronaphthalene | 0.04±0.03 |
| 562-5S | n-Undecane | 0.04±0.03 |
| 563-5S | 1-cis-3-Pentadiene | (0.08±0.04)[d] |
| 564-5S | 1-trans-3-Pentadiene | (0.08±0.03)[d] |
| 565-5S | 1,4-Pentadiene | (0.07±0.03)[d] |
| 556-5S | 1,3-Dimethyl-5-ethyl-benzene | 0.11±0.06 |
| 567-5S | cis-Decahydronaphthalene (cis-Bicyclo 4.4.0 decane) | 0.11±0.05 |

[a] The designation "-5S" following the sample number indicates a sample of 5 ml sealed "in vacuum" in a special Pyrec glass ampoule with internal "break-off" tip.

[b] The purity has been evaluated from measurements of freezing points as described in *J. Research* Natl. Bur. Standards *35*, 355 (1945) RP1676; unless otherwise indicated.

[c] Tolerance approximately ±10 percent.

[d] When sealed, polymer formed may be removed as residue by simple vaporization of the sample "in vacuum" at an appropriate temperature.

## *Safe Use of Chromic Acid in the Laboratory*

Many chemists believe that they must use chromic acid cleaning solution in order to make sure that glassware is chemically clean. Most laboratories, therefore, keep large amounts in ceramic crocks, pyrex dishes, or large graduates, usually without covers.

Such indiscriminate use constitutes a considerable hazard to laboratory personnel, since sudden breakage of the vessel could give severe acid burns. Solvents might get into open vessels of chromic acid with subsequent violent reaction and possibly fire. Laboratory workmen may also place their hand, inadvertently, into such large open vessels of the material.

To minimize these hazards, the National Safety Council suggests that laboratories restrict use of chromic acid as follows:

1. Lead or stainless steel vessels should be used to hold chromic acid solutions.
2. Ceramic pots, if used, should be taped. Glass vessels should be placed in a suitable secondary container, preferably lead or stainless steel, which completely surrounds the glass vessel.
3. All containers should have a lead or stainless steel cover which is not removed except when the solution is being used.
4. A pipette holder of lead or stainless steel should be provided for washing pipettes. The acid should not be repeatedly poured from or into the container.
5. All tall cylindrical containers of chromic acid solutions should be secured so that they cannot be knocked over.
6. Solvents should not be stored or used in the vicinity of these acid baths.
7. The use of detergents should be encouraged, wherever possible, in lieu of chromic acid cleaning.

## *Structure Series*

John Wiley & Sons, New York, began publication this month of a new series of advanced monographs on the structure of matter. The collection of monographs will be known as the "Structure of Matter" series. Dr. Maria Goeppert Mayer, of the Institute for Nuclear Studies at the University of Chicago, has been appointed editor of the entire program.

To introduce the series, Wiley published in January "The Structure of Matter," by Francis Owen Rice and Edward Teller. Their book summarizes the results of modern theories of structure of matter and shows the scope of the phenomena explained by quantum mechanics.

The series will continue over several years with monographs on more specialized aspects of the structure of matter. Manuscripts already in preparation include a treatise on the separation of isotopes, by Harold C. Urey and Karl P. Cohen; a book on superfluids, by Fritz London; and works on shock waves, solubilization, structure of liquid crystals, and experimental aspects of low temperatures.

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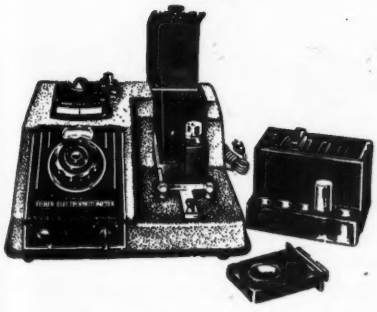

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# BOOKLETS & CATALOGS

## *Chemicals*

**6-Methylthiouracil** ..... B622

Description of properties of the compound and outline of its use in treatment of hyperthyroidism, together with a bibliography. Bulletin No. 111A, 8 pp., Schwarz Laboratories, Inc.

**Hydrates, Natural-Gas** ..... B623

Report on clogging in natural-gas pipe lines due to the formation of crystalline natural-gas hydrates. Operational techniques are described, together with a discussion of hydrate formation and properties and a bibliography. "Gas Hydrates and Their Relation to the Operation of Natural-Gas Pipe Lines," American Gas Association.

**Insecticides** ..... B624

Catalog describing insecticide raw materials sold under the trade-name "Orbiscide," including DDT, pyrethrum and rotenone products. "Insecticides—Raw Materials and Uses," 16 pp., Orbis Products Corp., Insecticide Division.

**Tall Oil** ..... B625

Discussion of tall oil sampling, the thirteen A. S. T. M. standard methods of testing and four unstandardized methods together with a bibliography on testing. Bulletin No. 4, 4 pp., Tall Oil Association.

**Carbon, Activated** ..... B626

The information in this booklet was originally intended for the water purification field, but the problems on storing, handling and feeding of activated carbon are practically the same throughout industry in general and for that reason the paper has been made generally available. "Storage, Handling and Feeding of Activated Carbon," 12 pp., Industrial Chemicals Sales Division, West Virginia Pulp and Paper Co.

**Chlorine Safety** ..... B627

A wall chart, "Recommendations for Safety in Use and Handling of Liquid Chlorine Cylinders and Containers" lists recommendation for storage, handling and use of liquid chlorine cylinders, as well as emergency, first-aid and prophylactic measures. The 18" x 23" chart is printed in color on linen backed paper and is suitable for hanging. Hooker Electrochemical Co.

**Benzene Hexachloride** ..... B628

Illustrated with tables and photographs, this book includes chemical, physical and insecticidal properties of benzene hexachloride, description of grinding methods, formulations, and insecticidal uses. "Benzene Hexachloride—Its Properties and Uses," 8 pp., Commercial Solvents Corp.

**Chemicals, Fine** ..... B629

A new price list includes various new Schwarz chemicals which have not hitherto been available. 4 pp., Schwarz Laboratories, Inc.

**Oil** ..... B630

A well-illustrated and documented historical narrative of oil in California. "California's Oil," 28 pp., American Petroleum Institute.

**Chemicals** ..... B631

New price list for essential oils and other chemicals. 12 pp., Fritzsche Brothers, Inc.

**Herbicides** ..... B632

Description, formulations, methods of application, and uses for the various 2,4-D weed killers. "Du Pont 2,4-D Weed Killers," 20 pp., E. I. DuPont de Nemours and Co.

**Glucuronates** ..... B633

The application of naphthoresorcinol as a chemical reagent for the analysis of glucuronic acid and its derivatives. A list of thirteen references of studies and reports on investigations is also included. "Determination of Glucuronates with Naphthoresorcinol," Schwarz Laboratories, Inc.

**Insecticide** ..... B634

Description and uses of "Marlate," which is bis(methoxyphenyl) trichloroethane, a DDT analog. "Marlate Insecticide 50," 8 pp., E. I. DuPont de Nemours and Co.

**Sequestering Agent** ..... B635

Specifications and applications of "Versene," the sodium salt of ethylenediamine tetra-acetic acid. "Versene," 1 pp., Bersworth Chemical Co.

**Hydrocarbons** ..... B636

The third edition of a catalog, together with a price list, listing and describing the line of hydrocarbons available from Phillips Petroleum Co. 160 pp.

**Dyeing of Rayon** ..... B637

A review of some of the work done in the Calco laboratories on the study of rayon dyeing. Technical Bulletin No. 806, Calco Chemical Division, American Cyanamid Co.

**Anti-Shine Agent** ..... B638

Description, method of application, and uses of "Killshine," a chemical formulation that removes the shine from fabric. Bulletin No. 12, 2 pp., Vitatex Products Corp.

**Resorcinol** ..... B639

Properties and uses of both technical and U. S. P. resorcinol, with specifications, information on handling and storage, reactions, and uses. Bulletin C-8-124, 15 pp., Koppers Co., Inc., Chemical Division.

**Latex, Natural Rubber** ..... B640

Origin and types, properties, handling and storing, compounding, and cost of natural rubber latex. "Fundamentals Every User Should Know About Natural Rubber Latex," 8 pp., Testworth Laboratories, Inc.

**m-Aminobenzotrifluoride** ..... B641

Technical data sheet giving physical data, description, suggested uses and applications of m-aminobenzotrifluoride. Data Sheet No. 366, 2 pp., Hooker Electrochemical Co.

**Sorbitol** ..... B642

The use of sorbitol as a polyol in the synthesis of solid and liquid vehicles for protective finishes. "Atlas Sorbitol in Protective and Decorative Finishes," 28 pp., Atlas Powder Co.

**Aluminum, Analysis for** ..... B643

Detailed information on tests, solutions, set-up and procedure, with curves and a tabulation of results for "Colorimetric Determination of Aluminum in Zinc Base Alloys." Silverstein and Pinsof, Inc.

**Indicators** ..... B644

Bulk price list for a series of sulfonphthalein and phthalein indicators, 1 p. National Biochemical Co.

**Sodium Chloroacetate** ..... B645

Properties, description and suggested uses of sodium chloroacetate. Technical Data Sheet No. 375, 2 pp., Hooker Electrochemical Co.

**Hydrofluoric Acid** ..... B646

A complete compilation of the physical properties, materials and type of construction for handling and storage, sampling and analysis, and uses of anhydrous hydrofluoric acid in alkylation, condensation and fluorination. "Hydrofluoric Acid Anhydrous," 36 pp., Harshaw Chemical Co.

**Repair Cement** ..... B647

Bulletin C-2 describes the physical, mechanical and chemical characteristics and methods of application of a resinous cement for repair of process equipment. The Carboline Co.

## *Equipment*

**Materials Handling** ..... H951

A pocket-size catalog describing the lift truck, hoists, cranes, etc., manufactured by Barrett-Cravens Co. Catalog 487, 88 pp., Barrett-Cravens Co.

**Lift Trucks** ..... H952

Description and special features of gasoline fork trucks of 3,000 to 8,000 pounds capacity. Bulletin 5101, 8 pp., Yale and Towne Manufacturing Co.

**Transformers** ..... H953

Detailed information on 107 types of standard instrument transformers, tables of mechanical and thermal limits of current transformers based on ASA standards, and a complete index. Booklet GEA-4626D, 80 pp., General Electric Co.

**Drum Finishing** ..... H954

Illustration and description of drum rotating unit, painter, and chime painter. "Eclipse Drum Finishing Equipment," 4 pp., Eclipse Air Brush Co.

**Motor Starters** ..... H955

Construction features and uses of manual and magnetic across-the-line starters, across-the-line combination starters, reversing starters, and push-button control stations, for alternating current motors. Bulletin 14B7132, 12 pp., Allis-Chalmers Manufacturing Co.

**Valves, Reducing** ..... H956

Ball inner valve for steam, water, air and gas at inlet pressures up to 250 pounds. Bulletin 140-S, 2 pp., Klipfel Manufacturing Co. Division of Hamilton-Thomas Corp.

**Joints, Rubber-Lined Pipe** ..... H957

Joints for installation and repair of rubber-lined pipes. "New Gaco Joints for Lined Pipe," 2 pp.. Gates Engineering Co.

**Tank Lining** ..... H958

Application, corrosion resistance, and effects of temperature on Koroseal sheet lining to protect chemical, acid and plating tanks. "Koroseal Lining," 4 pp., Metaweld, Inc.

**Filters, Small-Scale** ..... H959

Description of small operating units of several different types that are designed for making tests on a laboratory or semi-commercial scale to determine filtering characteristics of different products and the best type and size of filter for full-scale operations. Bulletin No. 251-R, 4 pp., Oliver United Filters Inc.

**Cranes, Self-Propelled** ..... H960

Applications of single-engine one-man operated self-propelled cranes in materials handling and construction operations. "Self-Propelled Cranes," 16 pp., Thew Shovel Co.

**Motor Starters** ..... H961

Motor starters suitable for use with 2300 to 4600 volt motors on a power circuit of any capacity. "Valimitor Motor Starters," 4 pp., Electric Controller and Manufacturing Co.

**Engines, Diesel** ..... **H962**

Ten to fifteen horsepower four-cycle engines for electric generation, direct power drive and pumping units. Bulletin 165, 5 pp., Nordberg Manufacturing Co.

**Conveyors** ..... **H963**

Construction features and specifications of gravity conveyors. Catalog RRC-48, Rapids-Standard Co., Inc.

**Separator** ..... **H964**

Description and operation of the Liqui-jector for continuous automatic liquid-gas separation without moving parts. "New Improved Selas Liqui-jector," 4 pp., Selas Corp. of America.

**Furnaces, Laboratory** ..... **H965**

Construction, operation and control of laboratory furnaces for temperatures of 300° to 2000° F. Bulletin 48A, 2 pp., Cooley Electric Manufacturing Corp.

**Thermocouple and Pyrometer Accessories** ..... **H966**

Detailed information on thermocouples, protection tubes and other pyrometer accessories, together with a technical section giving pertinent data on thermocouples. Bulletin P1238, 56 pp., The Bristol Co.

**Conveyors** ..... **H967**

Catalog description of long vibratory conveyors. 2 pp., Syntron Co.

**Belt Boosters** ..... **H968***

Illustrations, close-ups and charts pertaining to belt boosters. Bulletin PB-64-70-2A, 2 pp., Island Equipment Corp.

**Packings** ..... **H969**

Descriptions of packings for practically all chemical applications. Each type, including a new chemically inert packing, is fully explained and illustrated and recommendations are made for specific services and temperatures. "Packing for the Chemical Industry," Crane Packing Co.

**Heat Seal Papers** ..... **H970**

Technical manual describing heat seal papers for dry labeling, taping and wrapping with heat instead of water-moistenable adhesives. "Nashau's Heat Seal Papers," 23 pp., Nashua Gummed and Coated Paper Co.

**Heat Transfer** ..... **H971**

Description of an electric heat transfer system employing heat transfer oil suitable for temperatures 600° F. "A New Acnievement in Electric Heat Transfer," 4 pp., Gerin Manufacturing Co., Inc.

**Blast Guns** ..... **H972**

Folder describing a combination blast gun adaptable for sand blasting, solvent application, and spraying of liquids. Engineered Products, Inc.

**Heat Reclaimers** ..... **H973**

Tnree types of heat reclaimers: standard pit type Flexitube pit type and closed type, are described and illustrated in a 12-page bulletin. "Reclaim Those Dollars Down the Drain," Patterson-Kelley Co., Inc.

**Insulation Testers** ..... **H974**

Descriptions of heavy-duty insulation resistance testers together with illustrations, charts and diagrams. Bulletin 21-20-60, 23 pp., James G. Biddle Co.

**Heat Exchanger** ..... **H975**

Description of a heat exchanger design by which heavy, viscous, corrosive or sediment-bearing liquids are handled without fouling. Bulletin 1622, 11 pp., Griscom-Russell Co.

**Filter Presses** ..... **H976**

Afcomprehensive discussion of the various types of filter presses with descriptions, comparisons, costs, materials of construction, etc. Catalog No. 49, 25 pp., T. Shriver & Co., Inc.

**Valves, Shut-Off** ..... **H977**

Description and specifications of automatic low-pressure shut-off valves. "Warden," 4 pp., Security Valve Co.

**Conveyor** ..... **H978**

Illustration and description of a gravity conveyor for movement of cases, cartons, boxes, etc. Catalog RWC-48, 8 pp., Rapids-Standard Co., Inc.

**Valves, Shut-Off** ..... **H979**

Performance data on over 1,200 positive shut-off valves in service over five years on highly corrosive and highly penetrative fluids. Included are applications of hydrofluoric acid, propane, and organic fluorides. Engineering Report No. 94, 8 pp., Sellers Injector Corp.

**Mixers** ..... **H980**

Illustrations, descriptions, and specifications of mixers for dry and paste mixing, including double-arm paste mixers, ribbon mixers, double cone blenders, and various types of cylinder mixers operating in vertical and horizontal positions. Catalog V, 22 pp., Paul O. Abbe, Inc.

**Separator** ..... **H981**

Liquid-liquid separation of emulsions, steam distillations, solvent extractions, etc., without moving parts. Bulletin 730, 4 pp., Selas Corp. of America.

**Grinding, Pulverizing** ..... **H982**

Grinding and pulverizing mills and their application in mining, metallurgical, chemical, and other industries. Conical, cylindrical, rod, tube, and batch mills are described and illustrated. Bulletin AH-387, 4 pp., Hardinge Co., Inc.

**Gas Burners** ..... **H983**

Capacities, specifications, dimensions and alternative assemblies are described for gas burners, applicable to boilers, air heaters, dryers, kilns, ovens and other equipment to which open burners with controlled flames are suitable. Size range: 400,000 to 6,600,000 Btu/hr. output. Bulletin 7C, 6 pp., Bryant Heater Co.

**Sanitary Equipment** ..... **H984**

Description of the various types of equipment used in the treatment of water, sewage and industrial waste. Bulletin 48-41, 35 pp., Chain Belt Co.

**Gas Analyzers** ..... **H985**

Description and operating procedure of apparatus for rapid control analysis gas mixtures, including carbon dioxide, carbon monoxide, methane, oxygen, hydrogen, and nitrogen. Bulletin No. 213, 7 pp., Burrell Technical Supply Co.

**Motors** ..... **H986**

Totally-enclosed fan-cooled motors are equipped with tube-type air-to-air heat exchangers, solve the problem of removing heat losses without exposing electrical parts to harmful atmospheric conditions. Squirrel cage, wound rotor and synchronous types ranging from 150 to several thousand HP. Bulletin 05B7150, 4 pp., Allis-Cnalmers Mfg. Co.

**Feeding Tables** ..... **H987**

Hydraulic elevating tables for transporting and leveling strips and sheets to proper working height. Bulletin No. 261, 6 pp., Lyon-Raymond Corp.

**Humidifiers** ..... **H988**

Steam humidifiers automatically control relative humidity for prevention of dry air damage to hygroscopic materials. Tables and charts show desirable humidity in various industries, regain of hygroscopic materials, water content of air, elimination of static electricity, and data on the humidifiers. Bulletin No. 1771, 12 pp., Armstrong Machine Works.

**Conveyors** ..... **H989***

Light-duty roller-bed belt conveyor for handling boxes, cartons, etc. Diagrams, photographs, specifications and general information. Bulletin P-A5-1A-2, 4 pp., Island Equipment Corp.

**Valves, Safety and Relief** ..... **H990**

Safety and relief valves for protection of boilers, compressors, heat exchangers, kettles, pressure piping and vessels, process equipment and regulators. Illustrations, descriptions and specifications. Catalog No. 80, 24 pp., Marine and Industrial Products Co.

**Storage Racks** ..... **H991**

Characteristics and features of Barrett's storage racks and illustrations showing how storage capacity can be increased by use of racks. Bulletin 4873, 14 pp., Barrett-Cravens Co.

**Motors** ..... **H992**

Description of an electric deep well vertical pump Motor. Bulletin No. F-1454, U. S. Electrical Motors, Inc.

**Demineralizer** ..... **H993**

Small demineralizer with replaceable cartridges for attaching to a water tap. The capacity is 8 gallons per hr. "Hydrion Water Demineralizer," 6 pp., A. E. Tomkin & Co.

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The new Builders Conveyoflo meter continuously weighs and totalizes the flow of dry materials. The Conveyoflo can also be used for the automatic proportioning and controlling of dry or liquid feeders for secondary ingredients. Bulletin E4-550, 16 pp., Builders-Providence Inc.

**Generator** ..... **H995**

A "packaged" generator is available in single and three-phase up to 150 KW at 900-1800 RPM. Publication 2100-115, Electric Machinery Manufacturing Co.

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An automatic powder mixer mixes any powdered chemicals quickly and efficiently and also blends perfumes, oils and other liquids with powders. Capacity, 10 ounces. "Blendette Automatic Powder Mixer," 3 pp., R. F. Revson Co.

**Stirrers, Laboratory** ..... **H997**

Medium and heavy duty laboratory stirrers and pumps. "Laboratory Time-Savers," 4 pp., Burrell Technical Supply Co.

**Magnets, Separation** ..... **H998**

Detailed information on the application, construction, selection and suspension of separation magnets. Bulletin F-2001, 4 pp., Ohio Electric Mfg. Co.

**Separators, Magnetic Drum** ..... **H999**

Complete engineering data and table of operating capacities for permanent magnetic drum separators. "Permanent Magnetic Drum Separators," 4 pp., Eriez Manufacturing Co.

## *Miscellaneous*

**Polymers** ..... **J100**

A description of the guiding functions of a consulting engineer in the manufacture and uses of synthetic resins, polymers, and their plastic products. 17 pp., DeBell and Richardson, Inc.

**Surface Activity** ..... **J101**

Specific outline of the forms of research and services available on surface activity and detergency. 8 pp., Foster D. Snell, Inc.

**Exports** ..... **J102**

A series of articles of particular interest to firms now starting or considering an export program. "Four Ways of Doing an Export Business," 8 pp., Exporters' Digest.

**Atomic Energy** ..... **J103**

A new consulting service available on problems on atomic engineering. 4 pp., H. K. Ferguson Co.

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## *Chemical Structure*

CHEMICAL ARCHITECTURE, *edited by R. E. Burk and Oliver Grummitt.* Interscience Publishers, Inc., New York, 1948; 202 pp., $4.50. Reviewed by D. P. Stevenson, Shell Development Co.

THIS book, the fifth volume in the series, Frontiers in Chemistry, published under the auspices of Western Reserve University, maintains the high standards set by the previous four volumes of this series. It is a collection of six essays based on lectures given in the Western Reserve University Frontiers in Chemistry series.

As may be deduced from the title, the essays are concerned with various aspects of structural chemistry. The titles, authors, and lengths of the essays are: (1) Applications of Molecular Geometry in the Field of Reaction Mechanism, by H. S. Taylor, 22 pages. (2) Dipole Moment, Resonance and Molecular Structure, by C. P. Smyth, 28 pages. (3) Structure of Coordination Compounds, by W. Conard Fernelius, 47 pages. (4) X-Ray Studies of Randomness in Various Materials, by B. E. Warren, 19 pages. (5) Light Scattering in Polymer Solutions, by H. Mark, 50 pages. (6) The Nature of Inorganic Gels, by M. W. Tamele, 22 pages.

In each of these essays the authors succeed in providing the necessary background as well as the most recent developments of the subjects under discussion. However, due to their brevity, the essays do not constitute, nor were they intended to constitute, light reading. Any efforts expended by the reader in the study of these articles will be well rewarded. Taken together, these six quite independent essays constitute a satisfactory sequel—on applications—to the books on atoms and molecular structure by Lewis, Sidgwick, and Pauling.

Non-residents of the Cleveland-Akron area owe a debt of gratitude to Western Reserve University, the editors, R. E. Burk and Oliver Grummitt, and the Interscience Publishers for their respective efforts in originating these successful and popular courses of lectures on current research by eminent scientists, and making available to the scientific public at large the content of the lectures through the publication of their series of collected essays.

The quality of the paper, typography, and binding of this volume are in keeping with the excellence of the subject matter.

## *Vacuum Technique*

VACUUM MANIPULATION OF VOLATILE COMPOUNDS, *by R. T. Sanderson.* John Wiley & Sons, Inc., New York, and Chapman & Hall, Ltd., London, 1948; 162 pp., $3.00. Reviewed by Frank C. Benner, National Research Corp.

THE PURPOSE of this excellent volume is "to provide in one place enough practical information to enable an investigator with an average background of scientific training and experience to construct and operate a general-purpose high-vacuum apparatus for chemical research." The author has achieved his purpose in a highly satisfactory manner.

This book is a laboratory manual discussing the techniques of handling volatile, condensable substances in a high vacuum (pressures $10^{-3}$ mm. Hg or lower). By these techniques "volatile materials, even in very small amounts, can quantitatively be measured, mixed, separated, moved at will through reaction zones or from container to container, and otherwise manipulated without loss and without contact with anything but mercury and glass. Chemical reactions and their products can be studied, and such properties as melting point, vapor density, vapor pressure, dissociation pressures, and reaction rates can be readily measured."

Dr. Sanderson begins his discussion with chapters on materials of construction and operation and on glass blowing, proceeds with chapters on production of high vacuum, methods of measuring pressure, methods of producing and measuring low temperatures, then continues with chapters on valves, methods of introducing materials into and removing them from vacuum systems, methods of measuring volume, vapor pressure, methods of using cold traps for moving materials around within the vacuum system and then concludes with chapters on miscellaneous suggestions and methods, practice in high-vacuum technique, an outline of a general-utility high-vacuum apparatus, and a discussion of possible future developments and trends.

An appendix contains a compendium of vapor pressures of pure compounds and data for vapor-pressure thermometers and copper-constantan thermocouples.

Dr. Sanderson writes with clarity, and his instructions and discussions should be easily followed. He has refrained from introducing discussions of theory beyond the bare essentials, but has left little to conjecture regarding the practical details of laboratory manipulation. His discussions of materials of construction are

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especially fine in that he covers thoroughly the properties of the materials, including their shortcomings and safety hazards. Throughout the text, the problem of safety has been kept in mind and where practices are recommended which are somewhat hazardous, this is pointed out together with the author's opinion of the seriousness of the hazard.

This volume should be useful to any laboratory worker who is concerned with the construction and use of glass equipment operating under high vacuum and will be of particular interest to those engaged in conducting chemical research in high-vacuum glass apparatus.

This is a valuable contribution to the literature of laboratory high-vacuum operations.

## *Wood Flour*

WOODFLOUR, *by W. S. Dahl.* W. S. Dahl, publisher, 30 Stanley Road, Mortlake, London S.W. 14; 120 pp., $4.00. Reviewed by Richard W. Bowen, Becker, Moore & Co., Inc.

WITHOUT a doubt Mr. Dahl has attained a great deal of knowledge through his many years of experience in the wood flour industry. This experience has been gained entirely with the industry as it is in Europe but the uses of the product which he has mentioned conform very closely with the uses in this country. In one respect, however, we disagree with Mr. Dahl: We do not believe the stone mill is used for grinding wood flour in this country as he stated.

It is felt that anyone interested in the wood flour industry will find this book very interesting and authoritative as far as the production and uses of wood flour are concerned.

## *Agricultural Chemicals*

CHEMISTRY OF INSECTICIDES, FUNGICIDES AND HERBICIDES, *by Donald E. H. Frear.* Second Edition. D. Van Nostrand Co., Inc., New York, 1948; 417 pp., $6. Reviewed by John J. Craig, assistant editor, CHEMICAL INDUSTRIES.

IN THE second edition of his well-known text, Professor Frear has made another significant contribution to the organization of the still rapidly expanding field of insecticides, fungicides and herbicides. In addition to including the chemicals that have come along since the first edition was published in 1942 (DDT, 2,4-D and benzene hexachloride among others), he has revamped his work along chemical rather than biological lines. Chapters on the new chemicals, expansions of previously treated materials, and the handling of herbicides in a separate chapter provide a comprehensive compilation of the chemical phases of this burgeoning field.

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## *Other Publications*

A CATALOGUE OF INSECTICIDES AND FUNGICIDES, Vol. II, Chemical Fungicides and Plant Insecticides, compiled by Donald E. H. Frear. This is the second part of a report which covers the results of biological testing on a group of approximately 10,000 materials. It is extensively cross-indexed. 153 pp., $5.50. A limited number of copies of the two volumes, bound together in morocco and interleaved with blank paper will be available shortly at $22.50. The Chronica Botanica Co., Waltham, Mass., and Stechert-Hafner, Inc., N. Y. C.

SYNTHETIC ORGANIC CHEMICALS, UNITED STATES PRODUCTION AND SALES, 1946. This is the final report giving production and sales statistics and manufacturers of individual chemicals as compiled by the United States Tariff Commission. 159 pp., $0.45. Superintendent of Documents, Government Printing Office, Washington 25, D. C.

THE MARKETING OF CHEMICAL PRODUCTS by R. S. Aries and William Copulsky covers market research, commercial chemical development, technical sales and advertising, and technical service in the chemical industry. 150 pp., $5.00. Overland Commercial Corp., 26 Court St., Brooklyn 2, N. Y.

AUREOMYCIN—A NEW ANTIBIOTIC. A monograph of sixteen articles on the new antibiotic. 168 pp., $2.50. New York Academy of Sciences, Central Park West at 79 St., N. Y. 24, N. Y.

SYMPOSIUM ON SPECTROSCOPIC LIGHT SOURCES, containing four papers together with discussions. 80 pp., $2.00. A.S.T.M. Headquarters, 1916 Race St., Phila. 3, Pa.

A HUNDRED YEARS OF CHEMISTRY by Alexander Findlay. This is the second edition, following the first edition after ten years, and bringing it up-to-date. 318 pp., $4.50. MacMillan Co., N. Y. C.

ALUMINUM ALLOYS AND MILL PRODUCTS. Information on alloys, tempers, sizes, shapes and properties, together with a brief exposition on fabricating methods and other useful information. 162 pp., $1.00. Reynolds Metals Co., Inc., Louisville 1, Ky.

TRAINING EMPLOYEES AND MANAGERS FOR PRODUCTION AND TEAMWORK has been written by officials of Johnson & Johnson to describe many of the theories and practices of the industry. $5.00. Johnson & Johnson, New Brunswick, N. J.

DIE CHEMISCHE INDUSTRIE UND IHRE NEBENPRODUKTE is an extensive directory of the Swiss chemical industry and its products arranged by products. The 1948 edition is available in this country for $5.00. Dr. Franz F. Feigl, 157 Christopher St., N. Y. 14, N. Y.

EXPERIMENTAL IMMUNOCHEMISTRY, by Kabat and Mayer. A practical working manual of immunochemistry. 567 pp., $8.75. Charles C. Thomas, 301 East Lawrence Ave., Springfield, Ill.

A.S.T.M. STANDARDS ON PETROLEUM PRODUCTS AND LUBRICANTS. 745 pp., $5.50 (cloth binding $6.50). A.S.T.M. Headquarters, 1916 Race St., Phila. 3, Pa.

THE RUBBER INDUSTRY IN GERMANY DURING THE PERIOD 1939-1945. B.I.O.S. Overall Report No. 7. 150 pp., $0.90. British Information Services, 30 Rockefeller Plaza, N. Y. 20, N. Y.

DESIGN OF INDUSTRIAL EXHAUST SYSTEMS by John L. Alden. Second edition, 252 pp., $3.50. The Industrial Press, 148 Lafayette St., N. Y. 13, N. Y.

SUMMARIES OF TARIFF INFORMATION, several volumes, has been published by the U. S. Tariff Commission, Washington 25, D. C. Vol. I covers chemicals, oils, and paints.

LET'S LOOK IT UP is a catalog of technical books, available free of charge in the 1949 edition from Reinhold Publishing Corp, 330 W. 42 St., New York 18, N. Y.

MANUAL OF STANDARDS FOR TREATED WOOD covers preservatives, treatments, methods of analysis, and recommended practices. 150 pp., $5.00. American Wood Preservers Assn., 1427 Eye St., N. W., Washington, D. C.

A special list of recent scientific and technical publications of British government agencies has just been compiled by the Office of Technical Services, Dept. of Commerce, Washington 25, D. C., and is available to the public without charge.

TENTATIVE STANDARD ON PIPE FRICTION contains tables and charts of interest to those concerned with the flow of fluids in pipes. $1.50. Hydraulic Institute, 90 West St., N. Y. 6, N. Y.

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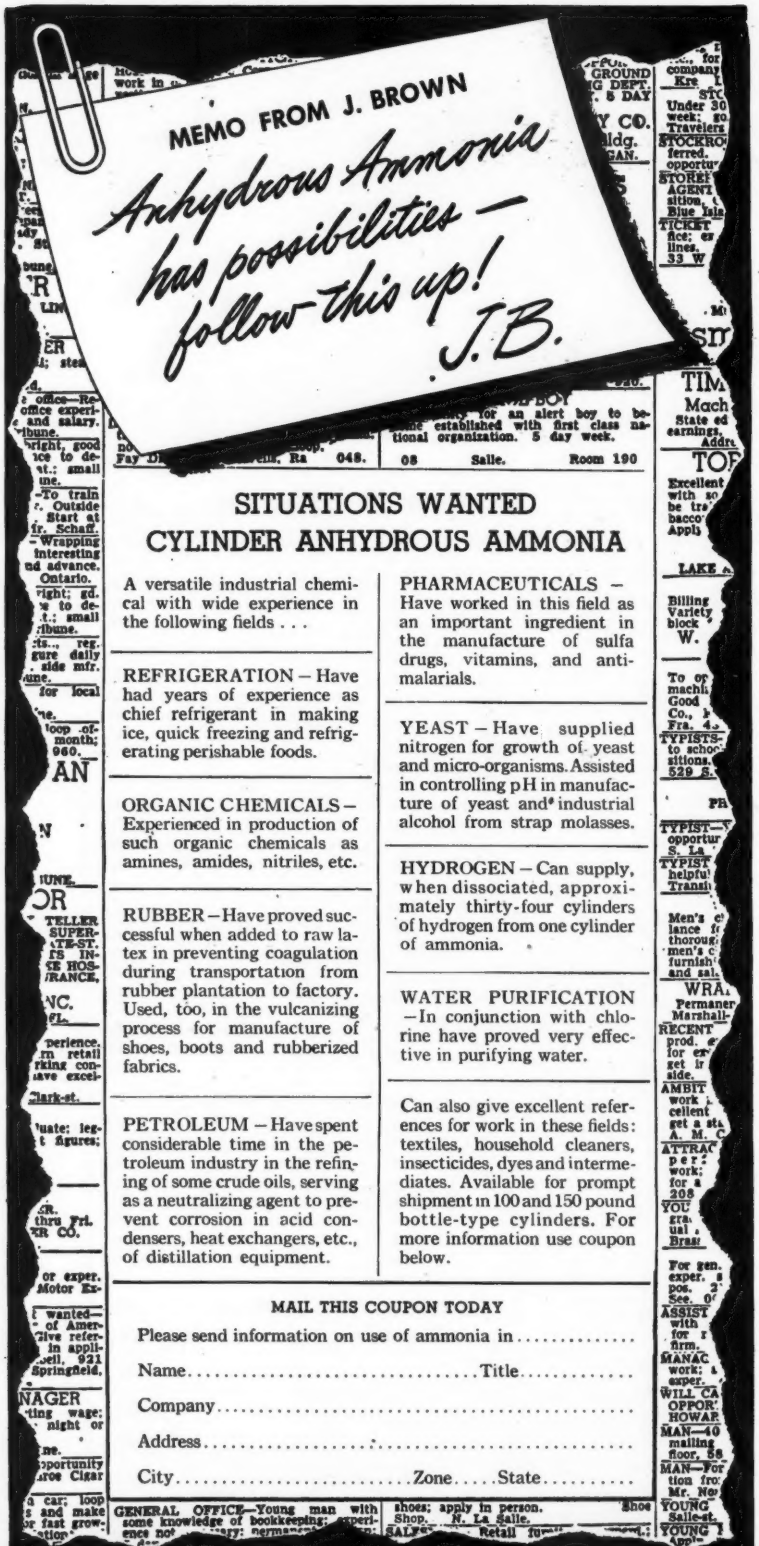
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THE CHEMICAL ARTS OF OLD CHINA by Li Ch'iao-p'ing. An illustrated exposition of the practical chemical arts in Chinese culture. 215 pp., $5.00. Chemical Education Publications, 20 and Northampton Sts., Easton, Pa.

VISCOELASTIC PROPERTIES OF POLYMER SOLUTIONS by John D. Ferry, University of Wisconsin. A publication of the National Bureau of Standards. 10 pp., $0.10. Superintendent of Documents, overnment Printing Office, Washington 25, D. C.

AUTOMOTIVE ANTIFREEZES by Brooks and Streets is a comprehensive study of cooling systems and coolants, types of antifreezes, and proper use, together with an extensive bibliography. It is a publication of the National Bureau of Standards. NBS Circular 474, 16 pp., $0.15. Superintendent of Documents, Government Printing Office, Washington 25, D. C.

THE PATENT POLICY SURVEY of the National Academy of Sciences has available several reprints of articles by Dr. Archie M. Palmer. A list of titles and prices can be had from the Survey, 2101 Constitution Ave., Washington 25, D. C.

THE COATING CORNER is a new house organ published periodically in the interest of better finishing by Brooklyn Varnish Mfg. Co., Inc., 50 Jay St., Brooklyn 1, N. Y.

WEEKLY REPORT ON UNITED STATES BUSINESS is published exclusively for overseas businessmen. Each issue, consisting of four pages, is airmailed every Friday. New York Journal of Commerce, 63 Park Row, New York 15, New York; $50 per year.

GLASS GLOSSARY contains several hundred terms in current use among the men in the glass industry. American Ceramic Society, 2525 North High St., Columbus 2, Ohio; $0.50.

OSAKA TRADE DIRECTORY 1948 is a classified list of the chief manufacturers, exporters and importers in Japan's greatest industrial center. Copies are distributed to overseas firms concerned with trade. Osaka Chamber of Commerce and Industry, Osaka, Japan.

CAUSES OF INDUSTRIAL PEACE is a series of case studies of good labor relations under collective bargaining. Case Study No. 2 reports on the Libbey-Owens-Ford Glass Co. and the Federation of Glass, Ceramic and Silica Sand Workers of America. National Planning Association, 800—21 St., N. W., Washington 6, D. C.; 64 pp., $1.00.

BAROID NEWS BULLETIN is a new house organ distributed by the Baroid Sales Division, National Lead Co., P. O. Box 2558, Terminal Annex, Los Angeles 54, Calif.

PREVENTION OF DETERIORATION is an abstract service available from the National Research Council of the National Academy of Science, Prevention of Deterioration Center, Room 204, 2101 Constitution Ave., Washington 25, D. C.; approximately 2,000 pp. per year, $37.50. An advance list of all reports received in this field by the Council is published monthly and is available for an additional $10.00 per year.

OFFICIAL METHODS OF ANALYSIS has been brought up to date by the 1948 revision. American Oil Chemists' Society, 35 E. Wacker Drive, Chicago 1, Ill.; $0.50.

ANALYSES OF COMPLEX MIXTURES OF GASES has been published by the Bureau of Mines in the interest of industrial safety. U. S. Government Printing Office, Washington 25, D. C.; Bulletin 471, $0.75.

PRODUCTION MANAGEMENT is distributed to employers concerned with problems implied by the title. Albert Ramond and Associates, Tribune Tower, Chicago 11, Ill.

FBI (FEDERATION OF BRITISH INDUSTRIES) REGISTER OF BRITISH MANUFACTURERS lists nearly 6,000 firms and their products, and includes much information of the greatest interest and utility to overseas buyers. The Products and Services section lists over 5,000 products to facilitate the rapid identification of supply sources. Twenty-first ed., 752 pp., 43 s. 6 d. including postage, Iliffe and Sons, Ltd., Books Department, Dorset House, Stamford St., London, S. E. 1.

HANDBOOK OF URANIUM MINERALS, by DeMent and Dake. An exposition and catalog of the uranium and thorium minerals, including their occurrence, detection, location and exploration. A guide for the prospector and miner. Second ed., $2.00, 96 pp., Mineralogist Publishing Co., 329 Southeast Thirty-Second Ave., Portland 15, Oregon.

## Films

A sound and color film prepared by the Society of the Plastics Industry, Inc., shows the plastics research project at Massachusetts Institute of Technology sponsored by the Plastics Materials Manufacturers Association. It is available to interested groups; 16mm, 20 minutes.

WATTS IN GLASS deals with the manufacture of Fiberglas in its specific applications in the field of electrical insulation. It is available free of charge for showing. Owens-Corning Fiberglas Corp., Toledo 1, Ohio; 26 minutes.

"THE ONE MAN GANG" is a 30 minute sound movie on materials handling now being released for showings at groups and meetings by the Towmotor Corp., Cleveland, Ohio.

# COWLES CHEMICALS

## DRYMET*

### The Economical Detergent Silicate

Cowles DRYMET is the most highly concentrated form of sodium metasilicate available. It is more economical to use, on the basis of both $NA_2O$ (alkalinity) and $SiO_2$ (silicate) than any other type of hydrated or anhydrous detergent silicate, either compounded or by itself. DRYMET contains no water of crystallization.

## DRYSEQ*

### The All-Purpose Detergent Silicate

Cowles DRYSEQ, anhydrous sodium sesquisilicate equivalent, is a medium pH alkaline cleaner which will do fast, dependable work at a low cost to the user. It is a white, free-flowing powder, quickly and completely soluble in hot or cold water—containing 56.75% $Na_2O$—making it an economical base material for compounding.

## DRYORTH*

### The Heavy-Duty Detergent Orthosilicate

Cowles DRYORTH, of itself, is a powerful, speedy, heavy-duty cleaner with valuable penetrating and wetting-out properties, reinforced dirt-removing power and unusual emulsifying action. It is an anhydrous, free-flowing powdered silicate containing not less than 60% $Na_2O$, which may also be used as an economical constituent of high pH cleaning compounds.

## CRYSTAMET*

### The Medium pH Pentahydrate Sodium Metasilicate

Cowles CRYSTAMET is a pure, perfectly white, free-flowing granular product with the normal 42% water of crystallization. Suggested for compounding when it is desirable to lower the concentration of a finished product. Readily soluble—chemically stable—easy to handle. Can be used on medium pH jobs.

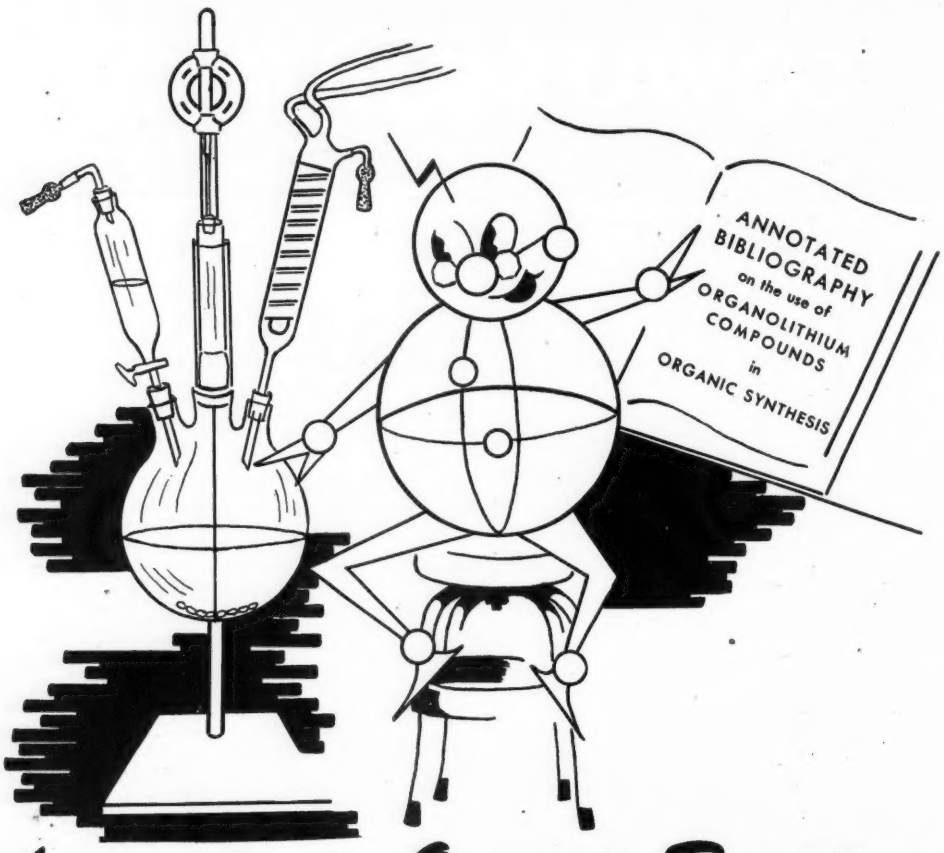
*Reg. U. S. Pat. Off.*

*We'll be glad to send you our DRYMET File Folder containing complete technical information and suggested formulations.*

**PROMPT SHIPMENTS FROM CONVENIENT WAREHOUSE STOCKS**

## Cowles Chemical Company

**HEAVY CHEMICAL DEPARTMENT • CLEVELAND 3, OHIO**




# *Developments in Organic Reactions Utilizing Organolithium Compounds*

During the past several years, the organic chemical industry has made rapid advances. Today, it occupies a commanding position in the national life.

Not the least important of these valuable developments have been organic reactions utilizing Lithium metal or compounds derived from it. For example, organo-Lithium compounds similar to Grignard Reagents are extremely useful. Because of their greater reactivity, they produce higher yields and frequently different end products in cases where Grignard Reagents act slowly or not at all.

And new methods utilizing Lithium Aluminum Hydride reduce aldehydes, ketones, acid chlorides and esters to alcohols, nitriles to amines, and aromatic nitro compounds to azo compounds. Almost quantitative yields are obtained at room temperatures without unusual equipment and at an easily regulated, convenient rate.

Lithium Amide, too, due to its stability as compared to other alkali amides is a convenient, safe and instantly available reagent for such organic reactions as Claisen condensations, alkylation of nitriles and ketones, and syntheses of ethinyl compounds and acetylenic carbinols.

Recognizing the interest of organic chemists in these developments, Metalloy Corporation is making available, in limited quantity, an annotated bibliography on the use of organo-Lithium compounds in organic synthesis. It contains concise abstracts of 223 articles from chemical journals, giving periodical source, date and author.

***MAIL THIS COUPON***

Attach to your business letterhead, please
Send me the booklet
"Annotated Bibliography on the use of
ORGANOLITHIUM COMPOUNDS
IN ORGANIC SYNTHESIS"

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**Specialists in LITHIUM and LITHIUM compounds**

**METALLOY CORPORATION**
RAND TOWER MINNEAPOLIS, MINN.
Division LITHIUM CORPORATION OF AMERICA, INC.

# NEWS OF THE MONTH

**Mathieson Chemical Corp.** is negotiating to buy the Standard Wholesale Phosphate and Acid Works of Baltimore for $8.7 million. Mathieson had stipulated that holders of two-thirds of the stock must accept its offer (sell for cash or exchange one share of Standard for one share of Mathieson common plus $17 in cash), and more than that number have agreed. Details are being worked out, and it is expected that the deal will be consummated soon.

A new contact sulfuric acid plant, the largest ever built, which has just been completed by Chemical Construction Corp., a unit of American Cyanamid Co., is part of Standard's holdings. When this unit is in full production, it will produce 500 tons of sulfuric acid a day.

In addition to the chemical and fertilizer plants in Baltimore, Standard has subsidiaries at Williamston, N. C., and Lebanon, Pa. Company assets were reported on May 31, 1948, as about $13.5 million.

**John G. Bill, elected vice-president in charge of domestic sales of Sharp & Dohme, Inc. He has been with the company for 23 years, his latest position being that of general sales director.**

**Seventy-seven post-graduate** and post-doctoral fellowships are being awarded to forty-seven universities in this country by the Du Pont Co. throughout the 1949-1950 academic year. These awards totaling $226,800 are to encourage graduate research in chemistry, physics, metallurgy and engineering.

In addition to this program, the company has instituted a program of grants-in-aid to ten universities for unrestricted use in fundamental chemical research. For the academic year of 1949-1950, $10,000 is being given to each of these institutions, and the company hopes to continue this support for a period of five years.

**First production** of ammonium sulfate has begun at the Phillips Chemical Co.'s partially completed plant at Port Adams on the Houston Ship Channel, Texas. Full-scale production is expected by the end of the month.

**Westvaco Chemical Corp.'s** $4 million phosphorus plant near Pocatello, Idaho, is near completion, and the first electric furnace should be in operation by the end of April. The Union Pacific recently completed a 23-mile spur to the Simplot Co.'s phosphate rock pits to link the mines with both the Westvaco plant and Simplot Fertilizer Co.'s superphosphate operations.

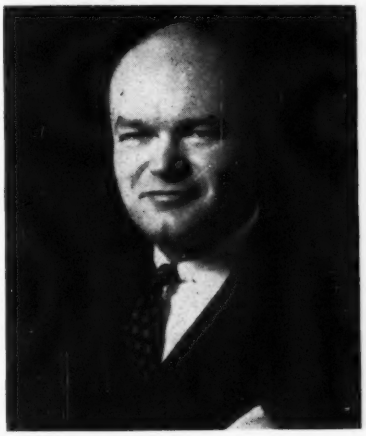
**Nationalization** of the chemical industry of Britain looms as a possibility as the government undertakes a survey. The survey of this basic industry will cover its long-term plans, its probable lines of development, and the steps regarded as necessary to meet these objectives. The report will be ready by the middle of 1949.

**First substantially complete** listing of American and foreign patents on shale-oil products has been completed by the U. S. Bureau of Mines. Issued as Bulletin No. 467, "An Index of Shale-Oil Patents," and containing all patents on record in the U. S. Patent Office up to Jan. 1, 1945, it may be obtained from the Superintendent of Documents for 75 cents.

**Process Industries Engineers, Inc.,** a new company with offices at Pittsburgh, Pa., is offering two complementary services: sale of equipment of nationally known manufacturers where engineered applications are satisfactory, and design and fabrication of equipment where special designs are necessary. The company will serve the processing industries by specialization in unit process operations and in such processes as impregnation, drying, vulcanization, and fumigation.

**Koppers Pittsburgh Co.** is the name of the new Delaware corporation formed by Koppers Co., Inc., and Pittsburgh Plate Glass Co. The new organization in which each company owns 50 per cent of the outstanding stock, has taken over the phthalic anhydride plant at Kobuta, Pa., to which an addition has been made recently. The Chemical Division of Koppers, which had operated the smaller plant, will continue to operate the enlarged plant for the new organization.

**Polyvinyl alcohol** facilities will be expanded at the Niagara Falls, N. Y., plant of E. I. du Pont de Nemours & Co. by a $3 million project to be completed in about two years. A continuous process will replace the present batch process for the solid alcohols that find application as adhesives, sizings, coatings, films, and emulsifying and thickening agents.



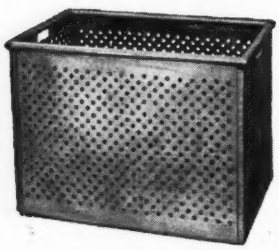
**Osgood V. Tracy, appointed manager of chemical products department of Esso Standard Oil Co. He has been assistant manager of the department.**

**Chas. L. Huisking & Co., Inc.,** has purchased a substantial interest in Robinson Brothers Buffalo Ammonia, Inc., Brooklyn, N. Y., and will actively manage the business, renamed Robinson Brothers Chemicals, Inc. The change in name is to indicate more clearly the scope of the company as producer and distributor of industrial and fine chemicals as well as household products. The Buffalo Ammonia Division of the company will henceforth handle the latter.

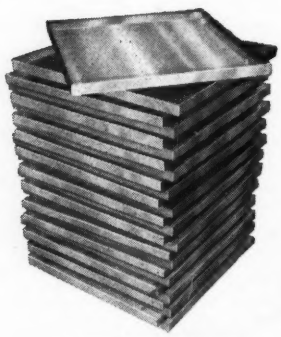
**Seventy-three patents** pertaining to the chemical field have been made available for non-exclusive royalty-free licensing by the Office of Alien Property, Department of Justice. They cover alkali metals, sodium perborate, hydrogen peroxide, formaldehyde, hexamethylene tetramine, ceramic colors and precious metal preparations for ceramic use.

**Pennsylvania Industrial Chemical Corp.** is planning a new $1 million dis-

# Stainless Steel
## THE MONEY SAVER

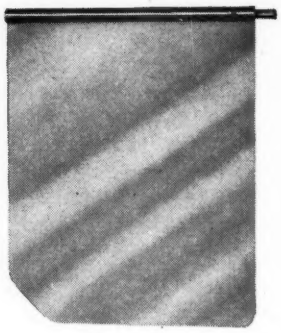


Doffing Boxes and Dye Beck Reels

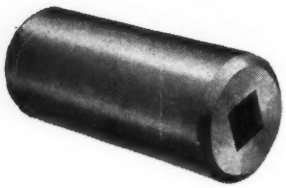


Watertight and Flanged Shelf Dryer Pans

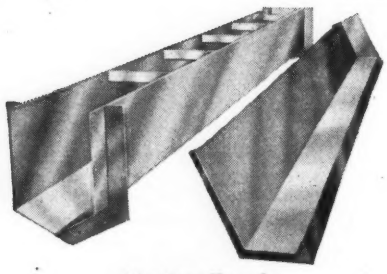
Brackets



Separators



Cloth Reel



Washing Troughs

**The money you can save by using *Stainless Steel* should be an important factor at replacement time. *Stainless Steel's* non-corrosive, long wearing qualities mean fewer rejections and repairs, and far more economical upkeep.**

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**MANUFACTURING COMPANY**
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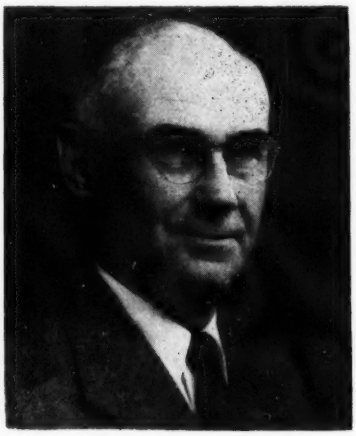
Fabricators of Solid Stainless Steel and Stainless-Clad Tanks • Dyeing Vats • Washing Tanks • Steam Drums • Storage Tanks for Acids and Alkalis • Mechanical Agitators • Separators • Stainless Steel Trucks • And Many Other Stainless Steel Products.


tillation plant on a 5-acre site near West Elizabeth, Pa. The unit, to separate precision fractions of aromatic oils in the production of resins, is expected to be completed in about six months. PICCO resins are produced from by-products of coke ovens and gas plants, and from turpentine and styrene.



**R. R. McClure, appointed general superintendent of the Diamond Alkali Co.'s pure calcium products division plant. With the company 19 years, he has been assistant manager of this division.**

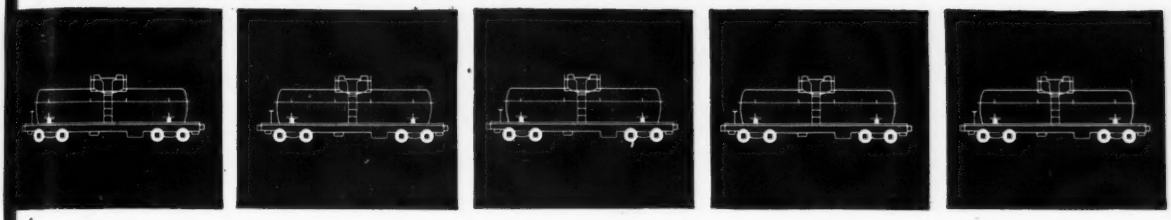
**Opening of a sixth plant**—at Palisades Park, N. J.—has marked the fortieth year in business for the Philip A. Hunt Co. The new unit, occupying 36,000 square feet of space, contains the company's largest research laboratory as well as production facilities for chemicals, mainly those used in photography and the graphic arts.

**A new continuous-type** retort promises to replace batch-type retorts at the U. S. Bureau of Mines' demonstration plant at Rifle, Colo. Pilot plant work has given greater recoveries of oil from oil shale by this gas-flow retort, and may mean that a major obstacle in this phase of the liquid fuels project has been passed.

**The Du Pont Co.** has been offering to license its cellophane patents, supply technical data and loan skilled personnel to companies that may be interested in expanding into this field. A suit filed by the Department of Justice in December, 1947, which in effect charges monopoly of the cellophane market by Du Pont is believed to have discouraged expansion by the company, and promoted the present action.

Present market for cellophane is estimated at $65 million, of which Du Pont sells about 75%, with the remainder going to American Viscose Co. Demand is expected to increase, but even with the tremendous savings Du Pont's help will

# pure, uniform caustic soda



# to meet your strictest requirements

Wyandotte Caustic Soda, as produced by the Mercury Cell method, meets the highest standards of quality. Commercially, it is free from sodium chloride, sodium chlorate, iron and practically all other impurities.

In the manufacture of rayon and other products—wherever high-grade caustic soda is essential—this truly fine chemical can be used *as delivered*, without further processing. Its purity and uniformity do not depend upon the efficiency of a purification system.

Recently completed facilities have enabled us to double our previous production of Mercury Cell Caustic. If your chemical needs include quality caustic soda, why not write us today?

**Wyandotte Chemicals Corporation**
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SODA ASH • CAUSTIC SODA
BICARBONATE OF SODA
CALCIUM CARBONATE • CALCIUM CHLORIDE
CHLORINE • HYDROGEN • DRY ICE
SYNTHETIC DETERGENTS • GLYCOLS
ETHYLENE DICHLORIDE
PROPYLENE DICHLORIDE • CHLOROETHERS
AROMATIC SULFONIC ACID DERIVATIVES
OTHER ORGANIC AND INORGANIC CHEMICALS

Wyandotte
REG. U. S. PAT. OFF.

mean to a company, at least $20 million will be needed to put another competitor in business.

**Operations have begun in** the new industrial oil processing unit of Swift & Co.'s Technical Products Plant at Hammond, Indiana. At the plant, units to carry out solvent crystallization, solvent fractionation and fat splitting are being integrally operated for the first time.

**First unit** of the new $3 million general chemicals manufacturing plant of B. F. Goodrich Chemical Co. at Avon Lake, Ohio, is scheduled to start operations in the second quarter of this year. New plasticizers for vinyl and synthetic resins will be the first products made in the new plant.

**The new Slaughter** natural gasoline plant built by Stanolind Oil and Gas Co. in the Slaughter field, Hockley County, Tex., will begin operations this month. In addition to daily output of 100,000 gallons of gasoline, the plant will produce 100,000 gallons of butane and 50,000 gallons of propane.

**New ways** of combating the menace of air pollution, progress toward conquest of high blood pressure, and recent chemical contributions to man's knowledge of heredity will be reported at the 115th national meeting of the American Chemical Society, to be held March 28 to April 1 in San Francisco.

**J. Kenson Simons, appointed associate director of research in the Plaskon Division of Libbey-Owens-Ford Glass Co. He will direct fundamental chemical research.**

**Associated Lead and Zinc Co.,** Seattle, a corporation formed jointly by The Eagle-Picher Co. and Northwest Lead Co., will distribute in the Pacific Coast area all lead and zinc pigments and oxides manufactured by Eagle-Picher.

**The Sumner Chemical Co.,** New York City, has appointed the B. W. Holmes Co., Berkeley, Cal., its exclusive representative for California, Oregon and Washington to handle its full line of fine organic chemicals.

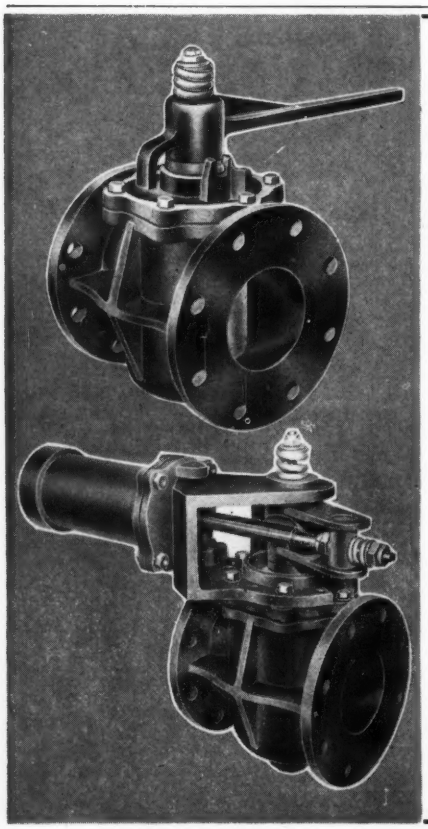
**A district office** to serve the South's expanding textile industry has been opened in Charlotte, N. C., by Monsanto Chemical Co.'s textile chemical department.

**Monsanto Chemical Co.'s** polystyrene products are all to be designated by the single label Lustrex. Lustrex will be further classified for specific uses and formulations. This move is in line with the plastics industry's aim to simplify all trade names.

**The refresher course** in vegetable oils sponsored by the American Oil Chemists' Society has been so successful that it will be an annual event. Subject matter of the course, held for one week in August at the University of Illinois, will vary from year to year.

**Research Information Service,** New York City, is offering a new service of cataloguing, translating and publishing in report form articles from current Russian technical publications.

**The Girdler Corp.,** Louisville, Ky., is making a detailed engineering survey

FROM ACETANILIDE TO ZINC SULPHATE—

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DeZURIK EASY-OPERATING VALVES

In any chemical-flow installation, DeZURIK EASY-OPERATING PLUG VALVES can provide new ease of operation, tighter closures, less trouble and maintenance, longer life. DeZurik's ECCENTRIC PRINCIPLE is the key factor in a rubber-faced plug-valve that seals dead-tight in any flow, handles smoothly, eliminates binding, scoring and plug distortion.

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It contains finer valves for your specific plant and problem.

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## Polycel® is the plastic filler with the "reinforcement dividend"

Polycel is not a wood flour! It is, specifically, a high strength fibrous filler applicable to high shock resistant compounds, or in combination with wood flour for the production of a medium impact strength group of molding compounds.

Polycel is new . . . but tests show that Polycel filled molding compounds also have a more desirable apparent density, much lower bulk factor and higher tensile strength than more expensive fibrous fillers. So, if you are looking for an inexpensive filler to impart high strength to your phenolic molding powders, write today for complete information and a sample of Polycel.

*Polycel, purified wood cellulose fiber, is produced in bleached and unbleached form in four grades varying in fiber length: Fluff, 20, 40 and 80 mesh.*

Other Products: *Snow Top Precipitated Calcium Carbonate* • *Ligro Crude Tall Oil* • *Indusoil Distilled Tall Oil* • *Tallene Tall Oil Pitch* *Tallex Abietic Acid* • *Sulfate Wood Turpentine* • *Alpha Pinene* • *Beta Pinene* • *Indulin (Lignin)*

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for the Mississippi Chemical Corp., in connection with that organization's proposed Mississippi nitrogen project.

## CALENDAR *of* EVENTS

*AMERICAN ASSOCIATION OF CEREAL CHEMISTS*, national convention, New York City, May 15-19.
*AMERICAN CERAMIC SOCIETY*, 51st annual meeting, Cincinnati, April 24-28.
*AMERICAN CHEMICAL SOCIETY*, 115th national meeting, San Francisco, March 27-April 1.
*AMERICAN INSTITUTE OF CHEMICAL ENGINEERS*, regional meeting, Los Angeles, March 6-9.
*AMERICAN INSTITUTE OF CHEMISTS*, annual meeting, Edgewater Beach Hotel, Chicago, May 6-7.
*AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS*, conference on the industrial application of electron tubes, Statler Hotel, Buffalo, April 11-12.
*AMERICAN MANAGEMENT ASSOCIATION*, 18th national AMA packaging exposition, Auditorium, Atlantic City, May 10-13.
*AMERICAN PAPER AND PULP ASSOCIATION*, annual meeting, Waldorf-Astoria, New York City, Feb. 21-25.
*AMERICAN PHARMACEUTICAL ASSOCIATION*, annual meeting, Jacksonville, Fla., April 24-30.
*COMMERCIAL CHEMICAL DEVELOPMENT ASSOCIATION*, annual meeting, Roosevelt Hotel, New York City, March 16.
*DRUG, CHEMICAL AND ALLIED TRADES SEC., N. Y. Board of Trade*, 23rd annual dinner, March 10.
*ELECTROCHEMICAL SOCIETY*, 95th convention, Benjamin Franklin Hotel, Philadelphia, May 4-7.
*METAL POWDER ASSOCIATION*, 5th annual spring meeting, Drake Hotel, Chicago, April 5-6.
*NATIONAL ASSOCIATION OF CORROSION ENGINEERS*, annual conference and exhibition, Netherland Plaza, Cincinnati, April 11-14.
*PACKAGING MACHINERY MANUFACTURERS INSTITUTE*, semi-annual meeting, Hotel Dennis, Atlantic City, May 9.
*SECOND PACIFIC CHEMICAL EXPOSITION*, San Francisco, Nov. 1-5.
*TANNERS' COUNCIL OF AMERICA*, leather show, Waldorf-Astoria, New York City, March 8-9.
*SCIENTIFIC APPARATUS MAKERS ASSOCIATION*, annual meeting, Atlantic City, April 25-27.
*TECHNICAL ASSOCIATION PULP AND PAPER INDUSTRY*, annual meeting, Commodore Hotel, New York City, Feb. 21-24.
*TWENTY-SECOND EXPOSITION OF CHEMICAL INDUSTRIES*, Grand Central Palace, New York City, Nov. 28-Dec. 3.

**Indoil Chemical Co.**, a wholly-owned subsidiary of the Standard Oil Co. (Indiana), will take over personnel and sales activities of the chemical products department of the parent company to permit more efficient handling of its chemical business.

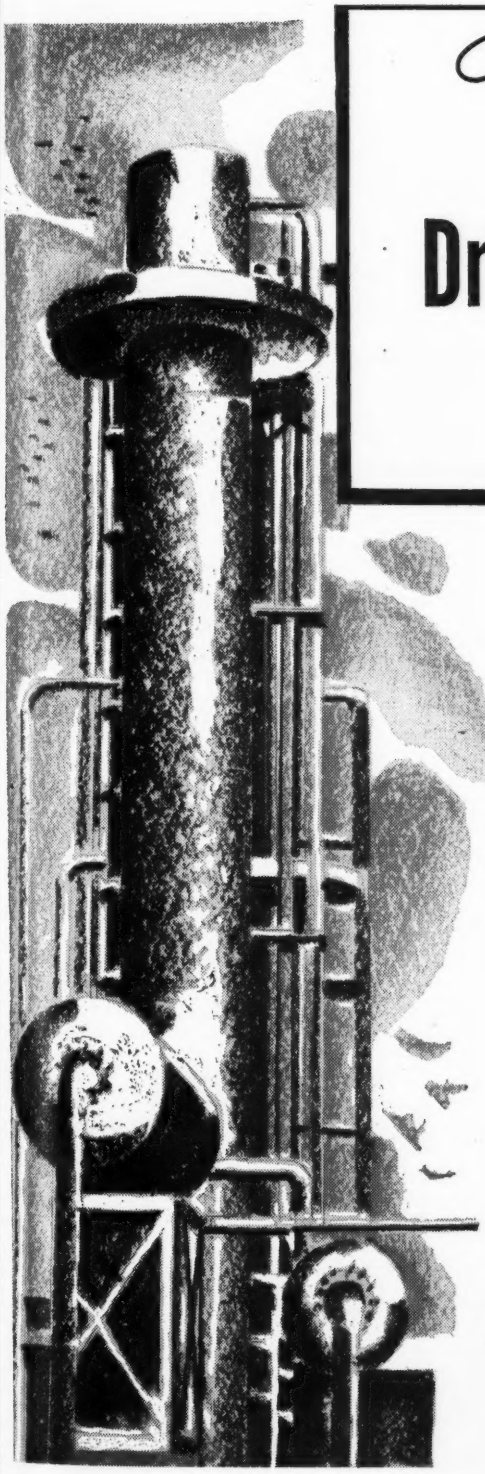
**Chairman** of the Pacific Chemical Exposition, scheduled for November 1-5, 1949, at the San Francisco Civic Auditorium, is James O. Clayton, California Research Corp. A committee of eight has been appointed to assist Mr. Clayton.

**Employees of The Dow Chemical Co.** subscribed 48,500 shares of the company's common stock under a recent payroll deduction purchase plan designed to encourage broader employee ownership.

**Monsanto Chemical Co.** will transfer its relatively small manufacturing operations at Decatur, Ill., to other company locations where related products are manufactured.

# Copper Chloride

## FOR GASOLINE SWEETENING



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# Dried $1\frac{1}{2}$ $H_2O$ Crystal
# Anhydrous

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Specify Harshaw Copper (Cupric) Chloride—an efficient gasoline sweetening agent for use with several standard recognized processes.

There is no better recommendation for Harshaw Copper (Cupric) Chloride than the long list of refineries which find this material necessary for their operations.

Your needs, too, will be satisfactorily met when you choose any of the three types of Harshaw Copper (Cupric) Chloride.

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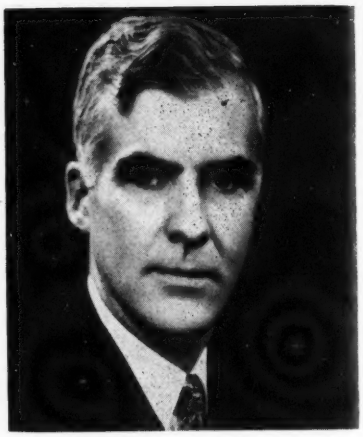


George E. Ziegler, named director of the Midwest Research Institute. He has been with the Institute since its inception in 1945.

# PERSONNEL

## *Company Officers*

• Howard R. Peterson has been elected vice-president of Indoil Chemical Co., chemical subsidiary of Standard Oil Co. (Indiana). He has been sales manager of Indoil and will continue in that capacity.

• Raymond B. Seymour, formerly chief chemist, has been appointed executive vice-president and general manager of the Atlas Mineral Products Co. Mr. Seymour was previously with the Goodyear Tire and Rubber Co., Monsanto Chemical Co., Johnson & Johnson and the Industrial Research Institute, University of Chattanooga.

• St. Regis Paper Co. has elected Roy K. Ferguson chairman of the board, which position has been vacant. He will also continue to act as president.

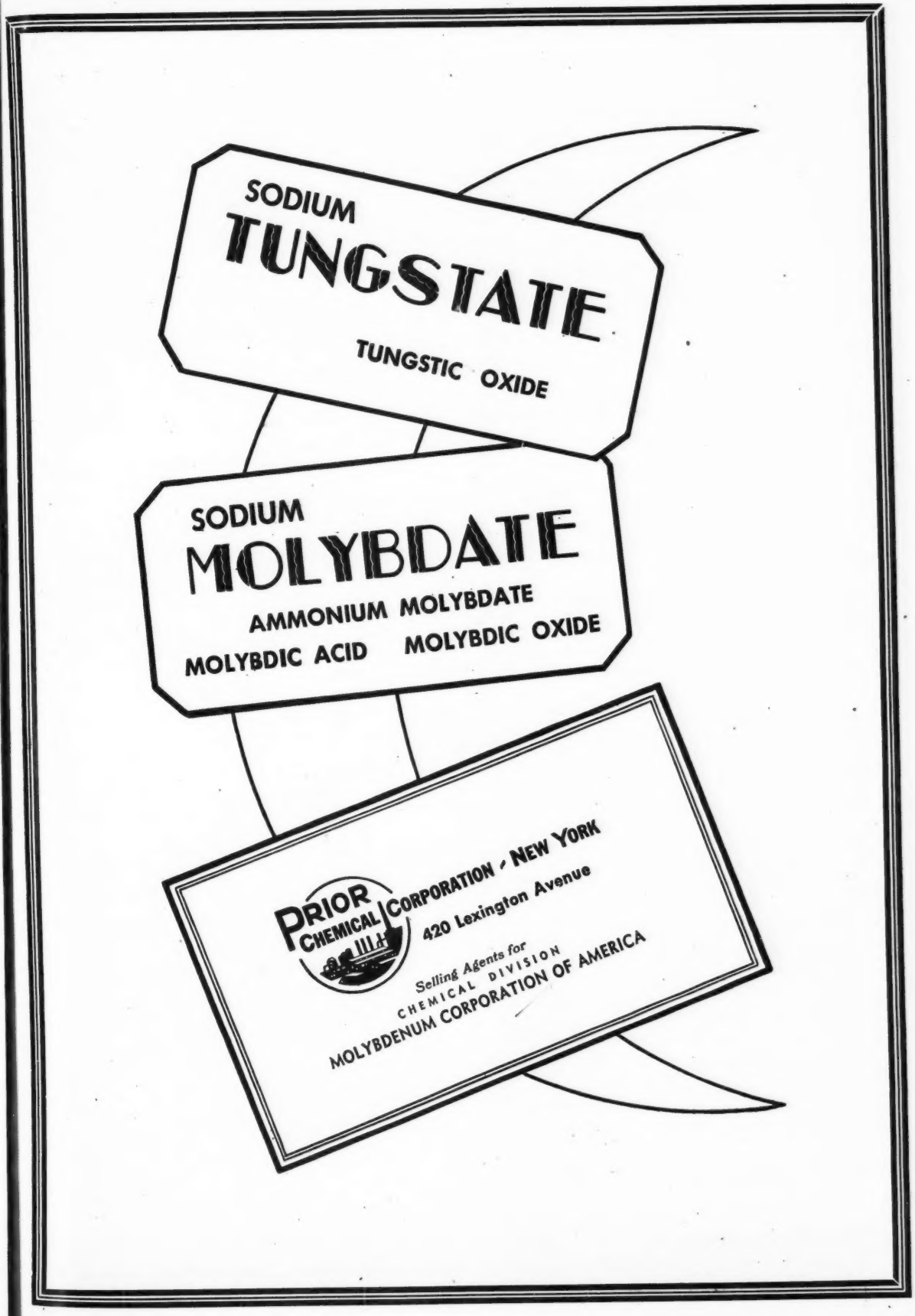
• Richard C. Doane has been elected vice-president in charge of sales, International Paper Co. He is resigning as vice-president and general manager of Canadian International Paper Co.

• The Poly-Cyclo Products Co., Cleveland, Ohio has appointed Ray W. Grace as vice-president and Ernest A. Munkacsy as secretary.

• Austin S. Igleheart, president of General Foods Corp., and Harold H. Helm, president of the Chemical Bank and Trust Co., have been elected to the board of directors of Commercial Solvents Corp.

• John Hart, formerly vice-president of Winthrop Products Inc., has been named head of the newly established New Products Development Division of the Sterling-Winthrop Research Institute. Most recently Mr. Hart was director of the department of professional relations of Winthrop-Stearns Inc.

• Fred T. Small, vice-president of Celanese Corporation of America, has been elected a member of the board of directors of the company. He will also assume direct responsibility for the physi-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| PHOSPHORUS PENTASULFIDE | POTASSIUM PERCHLORATE |
| PHOSPHORUS SESQUISULPHIDE | HYPOPHOSPHITES |
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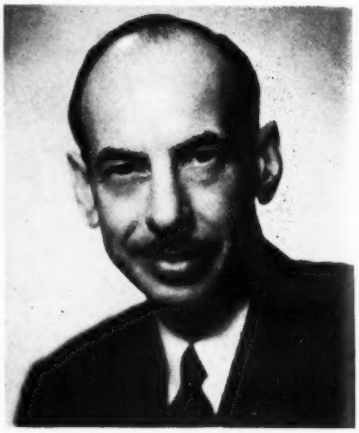
*New York Office:*
19 RECTOR ST., NEW YORK 6, N.Y.

cal condition of the company's operating plants which number twelve in this country, three in Mexico and another now under construction in British Columbia.



**A. C. Atwater, who has joined Thomas Bryan & Associates, Houston, Tex., as manager of the petroleum and chemical division. He has had wide experience building petroleum and chemical processing plants here and abroad.**

• Gane & Ingram, Inc., manufacturing chemists, has appointed Gerald S. Furman as vice-president in charge of domestic sales. He was formerly with Merck & Co., Inc., as director of field sales.

## *Production*

• Alden K. McCollom, of Kokomo, Indiana, has been named manager of the General Electric Co.'s laminated plastics plant at Coshocton, Ohio. He succeeds Arthur C. Treece.

• Harry A. Van Brocklin has been named manager of the Bridgeville plant, American Cyanamid Co., succeeding O. Luft, who has been transferred to New York headquarters as assistant production manager of Cyanamid.

James Dixon has been appointed manager, Dyestuff Dept., of the company's Philadelphia branch.

• Lynn R. Strawn, formerly of The Texas Co. at Port Arthur, has been appointed manager of the Neches Plant of Jefferson Chemical Co., Inc.

• E. K. Newton, who has been with Hooker Electrochemical Co., as an engineer since 1910 and has held various engineering positions with the company, has been appointed chief engineer to succeed T. L. B. Lyster, retired.

• H. R. Boehmer, general superintendent of the Sugar Creek, Mo., refinery of Standard Oil Co. (Indiana), has been promoted to manager at Sugar Creek to succeed the late R. E. Beard.

• Roland G. Renner has been named head of the Engineering and Development, Pyridium Corp., replacing Dr. Justin F. Wait, formerly head of the Engineering Dept., who has gone into

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| Moisture | 0.50% max. |
| Iodine Number | 1.0 max. |
| Melting Point | 129° C. min. |
| Specific Gravity 25°/15° C | 1.110 |
| APHA Color—2 grams dissolved in 50 ml. alcohol | 80 max. |

(C. P. grade is also available)

Sebacic Acid is a free flowing powder, white in color, with a high melting point. Its chemical reactions are similar to those of other aliphatic acids and it is easily converted to esters, salts, amides, ester-amides, acid chlorides and many other useful derivatives.

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### *Sales*

• Maneely Chemical Co. which opened a new $500,000 plant in Wheatland, Pa. on January 1st, has appointed William J. Nolan sales manager.

• R. R. Holmes, sales manager of the Tar Products Division of Koppers Co., Inc. since October, 1947, has been appointed assistant general manager of that Division.

• St. Regis Sales Corp., subsidiary of St. Regis Paper Co., has appointed Logan G. Hill as eastern sales manager of the Multiwall Bag Division of the company.

**H. B. Mann, new president and director of the American Potash Institute. Dr. Mann, who joined the Institute in 1936, succeeds John W. Turrentine, who has retired.**

• C. S. Hancock, on the sales staff of the Pure Calcium Products Division, Diamond Alkali Co., since 1936, has been promoted to manager of calcium carbonate sales.

### *Research*

• Joseph A. Neubauer has been named technical director for the Columbia Chemical Division of Pittsburgh Plate Glass Co. and for Southern Alkali Corp. Mr. Neubauer has served as technical advisor to the Columbia Chemical Division since 1945.

• William Lee Davidson, authority on atomic energy, has been named director of The B. F. Goodrich Co.'s physical research department.

• Maurice H. Bigelow has been named technical director of Plaskon Division of Libbey-Owens-Ford Glass Co. In his new post he has full responsibility for both technical service and research activities.

• Heinz Heinemann, prominent research chemist, has joined the staff of Houdry Process Corp. as a project director. He joins Houdry after serving as research chemist and research supervisor with Attapulgus Clay Co.

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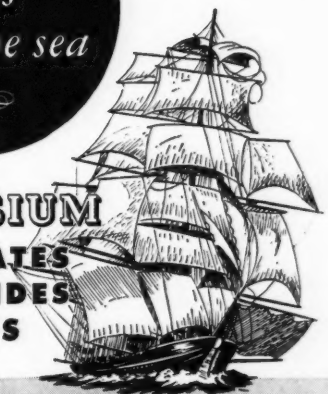

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# CHEMICAL SPECIALTIES

*A department devoted to news of the chemical specialties field. Descriptions of new specialty products will be found in the New Products & Processes department.*

## *NAIDM Plans Expansion, Change of Name*

The National Association of Insecticide and Disinfectant Manufacturers, Inc., is considering a plan of wide reorganization and expansion including a possible change in name. The plan worked out by the executive committee, headed by Leonard Oppenheimer, of West Disinfecting Co., and previously discussed by the board of governors, calls for a broadening of the activities of the association and the formation of five separate divisions, each with its own elected chairman. These divisions would include (1) insecticides, (2) disinfectants and deodorants, (3) floor waxes and floor finishes, (4) soaps, detergents and sanitary specialties, (5) aerosol products. The activities of the last three divisions named will include most of the expansion. This is aimed at attracting a greater membership, and giving better representation to present members in their products and business problems.

Based on an outline of the plan, a new constitution and by-laws have been drawn up by the association's general counsel, John D. Conner, of Washington, D. C., for submission to the membership.

Many names have been considered and discussed by the executive committee in submitting its plan. The one which appeared to have found most favor in the committee is "Chemical Specialties Manufacturers Association, Inc." Others discussed included "Sanitary Chemical Manufacturers Association," "National Chemical Specialty Association," "Sanitary Chemical Associates," "Cleanliness and Sanitary Associates," and others.

## *Niagara Alkali Building Trichlorethylene Plant*

Niagara Alkali Co. is constructing at Niagara Falls a new plant for the production of trichlorethylene, a chlorinated solvent widely used in industry chiefly as a degreasing and metal cleansing agent. The plant is expected to be in operation early this year.

Manufacture and sale of trichlorethylene is in line with the company's program to provide greater diversification of its chemical products.

## *New Paint Finish Like Baked Enamel*

Kem-Glo, a new wall and woodwork coating claimed to match in appearance and washability the baked enamel finish of refrigerators and other home appliances, has been developed by the Sherwin-Williams Co. The paint can also be used for radiators, metal cabinets, and outdoor furniture.

Kem-Glo may be applied by brush or roller-coater. It is ready to use as it comes in the package. No reducing with mineral spirits, turpentine, water or other thinners is required. One coat will cover most previously painted walls and woodwork; only two coats are required over new wood and bare plaster. Wall primers and sealers or enamel undercoaters are unnecessary.

The nine colors and a white in the Kem-Glo line will be available this spring throughout the United States in paint, hardware and department stores. It is packaged in gallons and quarts. One gallon will do the walls and woodwork of the average kitchen; two quarts will completely finish a good-sized bathroom and one quart will cover all the woodwork of the average living room. Retail prices: one gallon, $7.98; one quart, $2.39.

## *H. A. Dreer Markets Pelletized Seeds*

Henry A. Dreer, Inc., Philadelphia seed house, is now offering the home gardener Pelletized seeds in some of their tested varieties of the most popular vegetables and flowers. Pelletized seeds are a development of The Dow Chemical Co. in conjunction with the sugar beet industry (*see "Coats for Seeds," C. I., December, 1948, p. 937*).

With these bigger and better seeds, the home gardener can actually plan and plant his garden in one operation. A coating of beneficial chemicals and inert material (for bulk) makes each seed a uniform pellet the shape of a pea and somewhat smaller. Infinitesimal, hard-to-handle seeds can be space planted. Other seeds which normally are planted early in flats, can now be sown directly in the garden. The extra, back-breaking chores of thinning and transplanting are virtually eliminated.

## *Isocyanate Adhesives*

Although many of the isocyanates developed by the Germans appear to have potential wide application as adhesives, at present they seem to have promise only for bonding synthetic fibers to rubbers. The Du Pont Co.'s MDI [methylene bis (4-phenyl isocyanate)], which is sold as a 50 percent solution in orthodichloro benzene, is being used as an additive to elastomer cements for bonding rubber to nylon. While one user reports that it gives the best adhesion he has obtained so far in this application, the results are not consistent, and jelling of the cement caused by the MDI necessitates batch operation.

One of the large drawbacks to the development of uses of other of these materials has been their toxicity. Du Pont has made a number in small quantity over the past seven years, but dropped most of them because of this factor.

**R. T. Goodwin, manager of Shell Oil Co.'s aviation department since 1941, who has been named manager of the company's special products department.**

## *Readily-Soluble Gums Now Available*

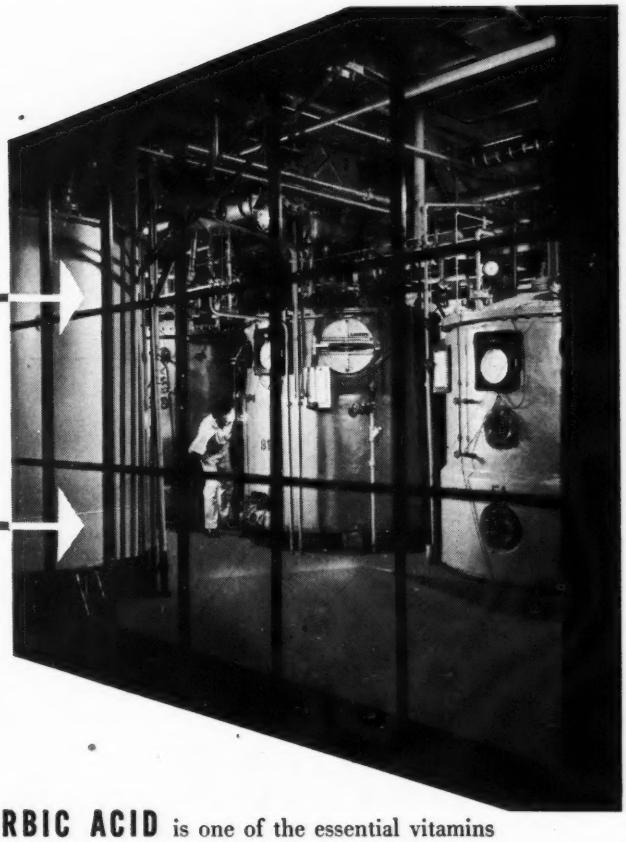
Gum tragacanth, locust bean (carob) and karaya that have been treated by a new process which renders them readily soluble in cold water are being marketed by Glyco Products Co., Inc., Brooklyn, N. Y. The new Glyco products, called "Aqualized" gums, dissolve in a matter of minutes without boiling, alkali treatments or mixing with sugar, glycerine, glycols or alcohol.

In addition to savings on heat and processing time, these modified vegetable gums eliminate degradation caused by such processing and wastage resulting from incomplete solution. Color, odor, taste and keeping qualities of the finished products are not altered. They may be used in food as well as in technical products as thickening, dispersing, emulsifying, stiffening and coating agents.

## *DDT Effect in Reservoirs*

DDT sprayed from airplanes may have a considerable effect on organisms in water, as noted in the January, 1949, issue of *Water & Sewage Works*. After such spraying of Wilmington, Del., and its environs during a polio epidemic in that area, one of the open reservoirs

# Laboratory *QUALITY* in *MASS* Production



**PFIZER ASCORBIC ACID** is one of the essential vitamins that illustrate the importance of large scale production to effect economies. Even with mass production methods, Pfizer has maintained "laboratory quality" results by placing emphasis on strict quality control.

In the room pictured here are some of the vacuum pan operations of the Ascorbic Acid (Vitamin C) process. In this operation, and others like it, a skilled staff operates efficiently, working under the close supervision of chemical engineers and other Pfizer technical and scientific personnel.

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serving the city system showed a rise in organism counts (from an average of 50 per ml. to a count of Synedra of 10,000 per ml.) and turbidity (up to 20 ppm.). When normal copper sulfate and chlorine treatments did not clear up the situation, it was concluded that DDT had upset the balance of organisms. Apparently Synedra was not affected by DDT, while other organisms normally antagonistic to Synedra were killed by the DDT. Hence Synedra thrived in the uninhibited environment. Cold weather and the cessation of spraying, along with increased use of chlorine and copper sulfate, brought a return to the normal balance.

Two other reservoirs in the area that were not in the zone of the spraying showed no appreciable change in organism count throughout the whole summer. On the basis of this, it has been concluded that DDT was responsible for the marked change in the other reservoir.

### *Emulsol Names Pesticide Sales Representative*

The Emulsol Corp. has appointed Pesticide Advisory Service, New York City, as its technical sales representative in the agricultural, sanitation, and industrial chemical manufacturing industries in New York and upper New Jersey. This company will assist in the sales and service of the Emulsol surface active specialties to insecticide, herbicide, sanitizing, detergent, paint, textile and other processors and formulators.

**P. C. Reilly, Jr., Reilly Tar & Chemical Corp., who has been appointed treasurer of the National Association of Insecticide and Disinfectant Manufacturers for the unexpired term of John Powell, formerly of John Powell, Inc., who has resigned.**

### *New Plastic Coating Developed by Goodrich*

A plastic coating which offers the horticultural field and fresh food packaging industry a new technique in preserving and packaging has been developed by the B. F. Goodrich Chemical Co. Use of the material, called Good-rite vinyl resin latex, will enable horticulturalists and packaging specialists to minimize spoilage and wilt which annually has resulted in thousands of dollars damage to fruit, vegetables, and a host of edible and decorative products.

A colloidal dispersion of vinyl resin in water, Good-rite vinyl resin latex dries quickly at ordinary room temperature and forms a transparent odorless film less than one-thousandth of an inch thick. It may be applied with a spreader, roller or brush, sprayed on with either a hand or mechanical sprayer or used as a dip.

The variety of applications foreseen for the new product include: a preservative coating for Christmas decorations, eliminating the nuisance of needle drop and keeping the tree, wreath or holly fresh and green; a supplement in insecticidal and fungicidal mixtures, greatly prolonging the useful life of many of these materials, increasing their effectiveness and allowing others to be usable when by themselves they are ineffective; a protective coating for trees, bulbs, roses and perennials, preventing them from dehydrating during transplanting, shipping and display; a supplement with 2,4-D, making the use of this material safer.


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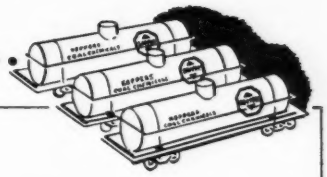

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# CHEMICAL MARKETS

## *Record Level To Continue For By-Product Coke Ovens*

Prospects are good that by-product coke operations which consumed a record 97 million tons of coking coal in 1948, will continue at the same high level, according to the Bituminous Coal Institute and the American Coke and Coal Chemicals Institute.

In 1948, 735 million gallons of coal-tar were recovered, of which about 550 gallons were distilled, a decline of 5 per cent from that of 1947. This loss of supply to the chemical industry resulted from greater amounts of coal-tar being consumed as fuel by steel mills faced with shorter supplies and higher prices of fuel oil.

Domestic production of creosote was off from about 161 gallons in 1947 to about 145 million gallons last year because of increased imports—50 million gallons last year as compared with 35 million gallons in 1947.

Benzene (other than motor grade) held to the level of the previous year, about 165 million gallons. Phenol (both natural and that from benzene) reached 300 million pounds in 1948, a gain of 35 million pounds over 1947. The plastics market consumed about three-fourths of this.

Toluene output from coke ovens also held to the 1947 level, 32 million gallons. However, that from petroleum totaled another 44 million gallons. Aviation gasoline claimed the greatest portion of toluene, with solvent uses also important.

Coke ovens yielded 8 million gallons of xylene in 1948, while petroleum accounted for 55 million gallons. Solvent uses in paints and lacquers claimed most of this.

Ammonium sulfate reached record levels in 1948, with 1,650 million pounds coming from coking sources.

## *Methanol to Expand Anti-Freeze Market*

The coming into balance of the methanol market (175 million gallons of the synthetic estimated for this year) is expected to see producers of the synthetic material shooting for a greater share of the anti-freeze business. About half the methanol produced is oxidized to formaldehyde, production of which has about reached a peak. The anti-freeze market, however, is expected to expand by as much as 10 million gallons. Last year, about 50 million gallons of methanol went into this field, and in addition to garnering most of the increased business, this year methanol producers hope to cut into other materials.

Methanol has a considerable advantage over ethyl alcohol in its higher boiling point. This was evident last year when its availability reduced the ethyl alcohol market in anti-freezes to about 12 million gallons. Ethylene glycol was also a factor in 1948 when a large increase in capacity made this permanent-type anti-freeze more available. No further increase in glycol capacity is scheduled this year however. The inference that ethyl alcohol cannot compete with methanol for the anti-freeze dollar possibly can be drawn from Du Pont's withdrawing its ethanol anti-freeze from the market. If that is the case, methanol will battle it out with ethylene glycol on the basis of price, for a gallon of methanol-based anti-freeze sells for about $1.25 while the glycol type is $3.50. One producer has conducted an aggresive campaign to show that non-permanent anti-freeze is satisfactory for the average car owner, and more will probably follow.

## *Rubber Stabilizing At High Level*

Expected tire sales for 1949 should reach 86 million units, an increase of 2 million over last year. Prewar peak was in 1940 when sales reached 60,622,000 tire units, and even in 1941, the total was under 69 million. Tires, tubes, and tire products account for about 70 per cent of total rubber consumption.

The prospect of this continued high level means that the rubber industry is on a higher plateau of activity in the postwar era. In the three years since V-J Day, the industry has consumed 55 per cent more rubber than in its three previous peak years added together. Since the backlog of demand for tires has not been a factor for a year, present consumption is a reflection of the expanded market offered by a greater number of vehicles.

In addition to greater demand for rubber for tires, there will be a continuing increase in the use of rubber for industrial applications. Materials handling jobs provide a market for rubber conveyor belts, and many non-transportation roles are expanding.

## *Minerals for Chemicals Had Record Year*

The minerals used most extensively by the chemical industry—sulfur, salt and lime—were all shipped in record quantities in 1948. An estimated 4,900,000 long tons

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The GATX reporting mark identifies the General American fleet of more than 40,000 tank cars of 207 specialized types. This fleet, built in General American's own plants and serviced by General American's shops and offices everywhere, continues to give shippers the safe, economical transportation of bulk liquids they need.

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of sulfur were produced, as contrasted with 4,828,103 in 1947. Sodium chloride registered a modest gain with 16,200,000 long tons produced (estimated), as compared with 16,138,000 in 1947. Figures for lime in 1948 are not yet available, but the previous year's production was 6,778,979 short tons.

The United States continued to meet the world's expanded requirements of boron minerals. Fluorspar shipments continued at high levels in 1948, but were slightly under the peacetime record established in 1947. Barite purchases by oil well-drillers and chemical manufacturers neared the million-ton mark.

### *Fertilizer Outlook Good For 1948-1949*

More commercial fertilizer is expected to be available for the fiscal year 1948-1949 than in any previous year. The United States (including Hawaii and Puerto Rico) will use over two and three-quarters the average quantities used during the prewar years. Compared with the 1947-1948 figures, 1948-1949 supplies will represent about 7 per cent more nitrogen, 5 per cent more phosphate, and about 10 per cent more potash. These increases, however, relate to the United States as a whole, and do not apply uniformly to all sections of the country.

### *Tetraethyl Lead Demand To Increase*

Increased consumption of fuel by motorists, their demands for "high test" gasoline and the trend toward high-compression motors in cars all point to a continually increasing demand for tetraethyl lead which gives gasoline more power and less "knock". The major producer of this chemical, Ethyl Corp., is planning to increase its capacity by about 40 per cent over the next two years.

Although Ethyl Corp.'s present production is not known, trade estimates place it at about 175 million pounds a year. The other producer, E. I. du Pont de Nemours & Co., Inc., which has only been in the business for about a year, is estimated to be supplying about 80 million pounds a year.

### *Market Review*

Although for a time there was a firm tone in some of the heavy chemicals, in general there was a decline in resale prices that is likely to prevail. On the domestic scene, production has caught up with demand, while abroad increased production and lessened demand have combined with dollar shortages to make export possibilities less bright. Large domestic producers are quoting much lower prices for caustic soda and soda ash in the world market, and dealers cannot compete. A dealer must get $4-4.25 per cwt. for solid caustic soda in the light of his high costs, while producers are quoting $3.75 per cwt.

One heavy chemical that has been in tight supply in the market is chlorine. Demand for it in water treatment as well as for new paradichlorobenzene has been responsible for the situation. Most of the chlorinated solvents have reflected this tone.

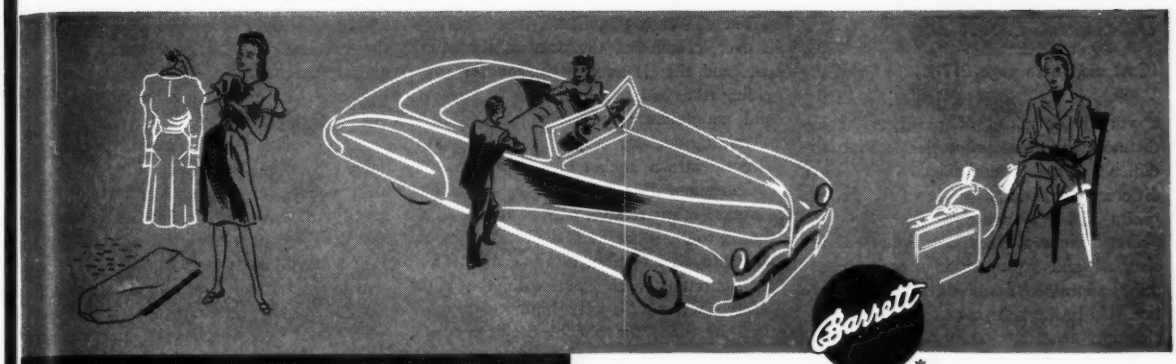
Several advances in agricultural chemicals featured that market. Lion Oil Co. increased its ammonia solutions by an amount equivalent to $11-14 a ton of nitrogen the first of the year. Chilean nitrate of soda also went up $3 a ton to $51 because of increased costs. One producer advanced his price of ammonium sulfate to $48 a ton—a $3 increase—, a move which caused speculation as to whether a general upward movement would take place.

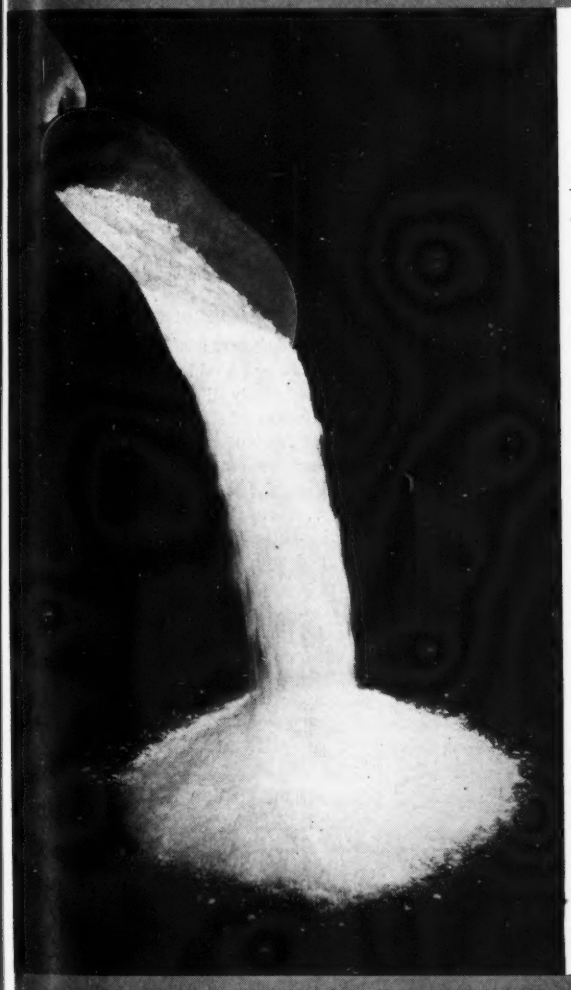
Industrial alcohol refused to relinquish the center of the stage entirely, although developments were not as spectacular as previously. There was a 3-3½¢ drop, followed by 2¢ drop that brought the price to 47 per cent below that prevailing in early November. Toward the end of the period, the price seemed to be nearing the bottom with a shading of ½¢ a gallon that brought the price of the proprietary solvent to 43½¢ a gallon. It appeared that the tone would be firmer.

During the freezing weather on the Pacific Coast there was some consternation as to what it would do to prices of citrus oils. A frost could leave more fruit available for pressing if the crop were not completely ruined. The essential oil market kept breaking as foreign producers were anxious for dollars. Higher costs presented a problem, but prices could not be raised under such conditions.

The poor condition of tanners who have been hit by high labor costs and competition from other materials kept the market for tanning materials dull. Although quebracho extract was dropped from 12¾¢ a pound to 11⅜¢, there was little buying. With many leather tanneries operating on reduced schedules, it was felt that the price would have to go to under 9¢ for much interest.

Among reductions were 5¢ a pound for tricresyl phosphate and ½¢ a pound for phenolic molding powder.



# PHTHALIC ANHYDRIDE

| | |
|---|---|
| Form | Clean, white flakes |
| Color — Molten | 55 Max. (Hazen) |
| Solid | Pure White |
| Solidifying Point | 130.5° C Min. |
| Odor | Slight, characteristic |
| Insoluble in Water | 0.01% Max. |
| Maleic Anhydride | 0.40% Max. |
| Foam Time | 18 minutes Min. |

Containers: 5-ply Paper Bags—80 lb. net weight.

Barrett* Phthalic Anhydride is of uniform and unsurpassed quality—pure white, free-flowing flakes containing a minimum of fines.

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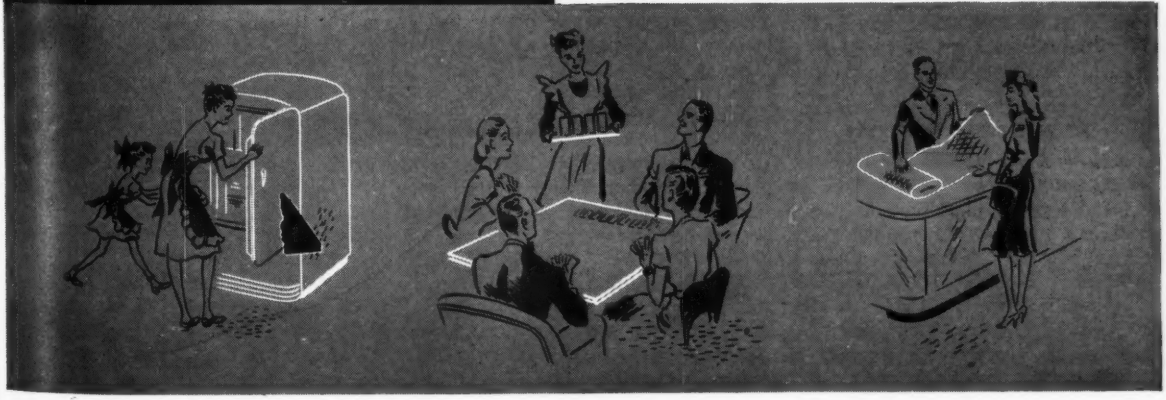

## DISINFECTANTS

(Continued from page 217)

a very wide class of products having distinctly different properties so that it is difficult to make general statements since different commercial products within this group will vary widely.

Detergent-sanitizers are intended for cleaning and sanitizing in a single operation, an improvement on previous practice. Up to the last year or so, thoroughly cleaning a surface before applying disinfectant or sanitizer was considered most important for effective antibacterial action. Some detergent-sanitizers, however, appear to be performing both operations surprisingly well. These products have been used mostly in the dairy field so far. Modern methods of pasteurizing milk do not eliminate the thermoduric (heat-resistant) bacteria which have been traced to the use of unsanitary milking machines. There has been a great deal of field experimentation within the last year with detergent-sanitizers for cleaning and sanitizing milking machines, and some excellent results have been obtained in supplying milk with low thermoduric counts to dairies.

## EVALUATION METHODS

An important consideration of the industry is evaluation of disinfectants and sanitizers, since the tests used are no longer very satisfactory. Although several methods are recommended in the literature, only the phenol coefficient method is considered official by the Livestock Branch of the Production & Marketing Administration of the U. S. Department of Agriculture. This agency is in charge of registration of labels and supervises claims and recommendations on sales promotional literature of products involved in interstate commerce.

Since it is the only test recognized officially, the phenol coefficient procedure has much more significance than any other suggested methods. Essentially, the method consists of finding the highest dilution of a product that is effective in killing a standard culture of test organisms in 10 minutes. The culture of test organisms must have a fixed resistance to phenol, which is used as a control.

### RECOMMENDED DILUTIONS

Any product labelled "disinfectant" should not be recommended for use at dilutions higher than 20 times its phenol coefficient. Therefore, for a phenol coefficient of 5, the highest use dilution for a disinfectant would be 1 to 100. This provides a wide margin of safety to take care of any reduction in germicidal activity in case the product is applied to a surface which is not thoroughly clean.

The efficiency of a disinfectant is rarely, if ever, checked at the point of its actual use, and this is another reason for providing the wide safety factor. Janitors and maintenance men have a bad habit of mixing coal-tar or pine oil disinfectant directly into a bucket of scrub soap and cleaning and disinfecting in one operation. Excess soap reduces the efficiency of these products, and it is doubtful whether adequate disinfection is obtained under such circumstances even with the high safety factor. Slightly higher dilutions than 20 times the phenol coefficient are allowed for quaternary sanitizers.

In the case of hypochlorites and organic chlorine-liberating products, the phenol coefficient determination is not applicable. Therefore, with products of this type, it has been necessary to determine proper concentration by experimentation under actual conditions of use. Chlorine-bearing sanitizers do not state any phenol coefficient, and manufacturers simply recommend dilutions for use which have been found to do the job under practical conditions. A wide factor of safety is allowed.

Quaternary ammonium sanitizers and some of the newer disinfectants containing high percentages of synthetic phenolics are still tested by the phenol coefficient procedure, but the method is by no means entirely satisfactory. Biological tests are generally less accurate than chemical analyses. Cultures of microorganisms (millions per ml) can not be completely standarized. In the phenol coefficient test the germicide is diluted more and more until an end point is reached. The better the germicide the higher the dilution required. A point has been reached now where bacteria are being destroyed with distilled water containing a trace of active germicide. Under such conditions it is bound to be inaccurate and can vary as much as 25 per cent. Yet, such a test is still the primary basis for label recommendation.

### PREFERABLE TEST

It would be preferable to use a type of test such as is used in the Water & Sewage Laboratories of the U. S. Public Health Service at Cincinnati. In this, a dilution of disinfectant or sanitizer is mixed with a washed suspension of the test organism and aliquot portions removed at varying time intervals from 15 seconds to 30 minutes after mixing, and the samples plated and the actual number of survivors counted. Inactivators can be satisfactorily introduced into this procedure to eliminate bacteriostasis, and organic contaminants and a standard hard water could be incorporated. With this type of procedure, a minimum number of survivors after a given time interval can be taken as the end point. It would be applicable to both hypochlorites and quaternaries.

In the fields where sanitizers are used, the efficiency of the operation is frequently checked. Local health department inspectors in many cities actually swab dishes and glassware to determine bacterial population after sanitization. In dairies raw milk counts and pasteurized milk counts are made regularly. The quality of canned orange juice is determined by frequent bacteriological as well as chemical analyses. Because of this continuous control program, it is realized that a sanitizer seldom does a perfect job. Too much depends on the laborer applying the cleaner and the sanitizer.

Usually a dish or piece of equipment in a food plant is considered to be effectively sanitized if no more than 100 bacteria are recoverable by swabbing an area of 4 square inches. A product capable of producing such results under controlled conditions is satisfactory at the dilution used. This practical evaluation means much more than current laboratory tests and arbitrary safety factors, which are not checked under use conditions.

### MANY REGULATIONS

Both disinfectants and sanitizers are subject to considerable federal and state regulation. Only disinfectants approved by the Bureau of Animal Industry of the Dept. of Agriculture may be used, and then must be used under the Bureau's supervision for cattle barns, cattle cars or yards, where Bang's disease or tuberculosis in cattle has been found. This Bureau also regulates sanitation in meat plants shipping in interstate commerce. The Food & Drug Administration of the Federal Security Agency inspects and regulates sanitation in food plants other than meat plants involved in interstate commerce.

The United States Public Health Service makes recommendations to State and Local Health Departments for the regulation of sanitation practices in public eating and drinking establishments and dairies. It has been estimated that there are some 15,000 regulations throughout the United States dealing with sanitation in restaurants, alone.

### RAPID EXPANSION

It is not surprising, therefore, that new products in disinfection and sanitation are slow to develop as compared to innovations in many other industries. The public, however, is gradually becoming more sanitation conscious and markets are steadily expanding. Although statistics are not readily available, sanitizers are estimated to be much more important than disinfectants in both dollar value and tonnages produced, and the sanitizer market is expanding more rapidly. More and more foods are processed before reaching the consumer and good sanitation is vital to the success of most food processing industries.

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## STEAM DISTILLED WOOD TURPENTINE

**This is a pure Steam Distilled Wood Turpentine, containing no impurities or adulterants of any kind. It is clear and colorless and has an unusually mild "flat" odor. CROSBY Turpentine conforms to Federal and ASTM specifications for Steam Distilled Wood Turpentine.**

| | SPECIFICATIONS Max. | Min. | Typical Analysis |
|---|---|---|---|
| Specific Gravity at 15.5/15.5°C | 0.875 | 0.860 | .861 |
| Refractive Index at 20°C | 1.478 | 1.465 | 1.466 |
| Unpolymerized Residue (38N-$H_2SO_4$) | 2.0% | .... | 0.8% |
| Distillation: | | | |
| Initial Boiling Point | 160°C | 150°C | 154°C |
| Distilling below 170°C | | 90% | 95% |

**PROPERTIES**

**Flash Point: Approximately 98°F. (Tag open cup).**
**Optical Rotation Above +25°.**
**Solvent Power: (Kauri Butanol): Approximately 57 ml.**
**(Aniline Point): Approximately 18°C.**
**(Mixed Aniline Point): Approximately 44°C.**

**COMMERCIAL INFORMATION**

**Code Word: TURPS.**
**Containers:**
**Tank Cars: 8000 and 6000 gallons.**
**Compartment Cars 3 x 2000 gallons.**
**Drums: 56-gallon galvanized drums, net weight, 392 lbs. (Gross weight approximately 450 lbs.)**
**Cans: Full line of lithographed tin cans, packed in corrugated cartons, contents in standard U. S. gallons, imperial gallons, and litres.**

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## UREA and MELAMINE RESINS

(Continued from page 230)

ance. Furthermore, by suitable modifications, melamine can be used in the preparation of either the cation or anion type of resin. Although melamine itself is a weak base, no basic properties are detected in a resin when it is suitably modified for the purpose of using it as a caution-exchange resin.

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**CHROMIC ACID**
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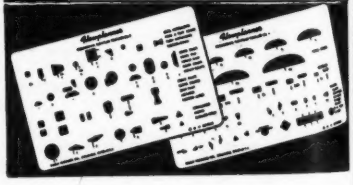

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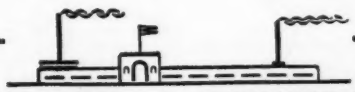

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## LEGAL DECISIONS

(Continued from page 244)

was necessary to remove the employe's eye. The employe then reported the injury to the Industrial Commission which refused to award compensation to the employe because a state law provides that no employe will be awarded compensation unless he reports the injury within one year after the occurrence of the injury.

It is interesting to observe that the higher court awarded compensation, stating that from a legal standpoint the injury did *not* "occur" until the employe's eye was removed. The court said:

"The injury and its casual connection with employment are undisputed. As soon as complainant (employe) was informed that he had lost the sight of his eye he took the steps required of him by the law to perfect his claim. Under these undisputed facts, we think that the statute of limitations commenced to run from 'the occurrence of the injury' and not from the occurrence of the accident."

### Breach Invalidates Contract.

Modern higher courts consistently hold that the instant one contracting party breaches a contract the other party is *relieved* from all further obligations.

For illustration, in McManus v. Bendlage, 187 Pac. (2d) 854, it was shown that one Bendlage was the sole owner of secret formulas and processes of manufacture of chemical products. He agreed to sell and deliver on a specified date to one Kohlsaat the secret formulas and processes, patent rights, trademarks, copyrights and tradenames, all assets, books and records of his business for a stated cash sum, plus additional monthly payments. Bendlage failed to turn over the secret formulas on the date specified in the contract.

The higher court held that this breach on the part of Bendlage relieved Kohlsaat from any further obligations. The court said:

"The breach of the contract by appellant (Bendlage) was a breach of the entire contract and discharged respondent (Kohlsaat) from any of the conditions to be performed. The contractual relation ceased to exsist."

### Who Owns Invention?

Considerable discussion has arisen from time to time over the legal question: If a chemical company's employe obtains a valuable patent, who owns the patent? The answer is: The employe owns it, unless the employer proves that (1) the employe was hired to experiment and devise new chemical inventions, or (2) the employe perfected the invention during the time and while being paid by the employer.

For example, in E. F. Drew & Company, Inc. v. Reinhard, 74 F. Supp. 574, the testimony showed facts as follows: One Reinhard entered the employ of a manufacturer of chemical products. As part of his duty he had "the development of new products, intended for sale to potential customers, and to develop processes for treatment of various substances including water and other liquids." Actually Reinhard acted as general manager and his duties were primarily sales work, writing of technical literature, advertising matter, drawing up of forms, establishing methods of analysis and control of boiler water, the handling of salesmen's reports, the management of the office staff, watching expenses, costs, etc., etc. During the employment Reinhard made an invention relating to a method of purification of water. This question was presented the court: Who owns the patent, Reinhard or the employer? The higher court held that Reinhard was the legal owner of the patent because the employer failed to prove that Reinhard had perfected the invention on the employer's time. The court said:

"One employed to make an invention, who succeeds, during his term of service, in accomplishing that task is bound to assign to his employer any patent obtained. The reason is that he has only produced that which he was employed to invent. . . . It is quite clear that he (Reinhard) was not employed to develop an invention, nor did he agree to assign any invention that he might make during the period of his employment."

For comparison, see American Cyanamid Company v. Hubbell, 3 Cir., 76 F. (2d) 807. Here the higher court ordered an employe to assign his chemical invention to his employer because the testimony showed that the employe was hired to experiment and also he had signed a contract whereby he bound himself to "assign to this company all property rights in any inventions" connected with the work of the company.

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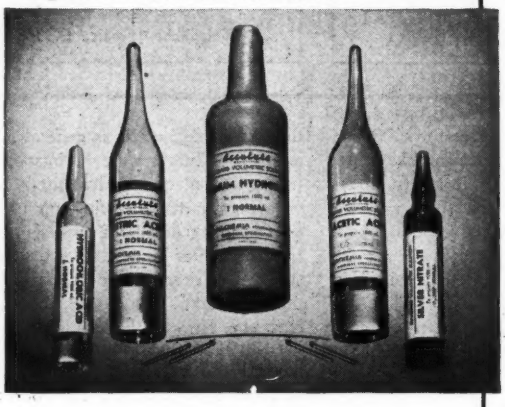

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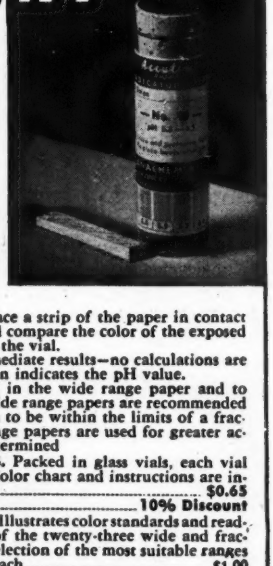

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# FROM WHERE WE SIT

*by "DOC"*

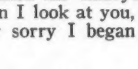
IN MOST PEOPLE, the oil of chemistry and the water of whimsy don't mix; but some super-emulsifying agent has made them compatible in the mind of Joel Hildebrand, professor of chemistry at the University of California. His recent book, "The Lowdown on Higher Education," includes at least one rhyme written since November 2:

Said the G. O. P. boss,
"They'll be thrown for a loss,
The Democrat chances are scant, I see."
But his prophetic dope
Proved to be but a hope;
One might call it a vain ele-fantasy.

WE HAVE ALWAYS been intrigued by by the little jots of information that newspapers find (probably under a stone) to fill out their columns. These little intelligencers tell us, for example, that in summer the body temperature of a chicken ofter reaches 106 degrees, or that armored horses were first used in the battle of Crevy in 1268 A. D. We just found one that we are eager to convey to the analytical chemists who look to this page for monthly inspiration: "Tiny fibers split out from kangaroo tail tendons are valuable in testing chemicals used in tanning leather."

A LOT OF PEOPLE we've talked to take a rather dim view of mankind's future. Some refer darkly to the Decline of the West; others — more mysteriously — to Existentialism; still others, to the first Tuesday of last November. Our friends at Philadelphia Quartz Co. reprinted a contemporary poem in the company's publication, *Silicate P's and Q's*, that epitomizes this modern attitude:

Said the Scientist to the Protoplasm:
'Twixt you and me is a mighty chasm;
We represent the extremes, my friend,
You the beginning and I the end.
The Protoplasm made reply
As he winked his embryonic eye:
Well, when I look at you, old man,
I'm rather sorry I began!



ATOMIC SCIENCE is indeed in a state of flux. So much so, that even the atomic scientist's aren't sure what's going on. That's what we conclude, at least, from a recent note we saw reguarding Calcium-41, for which decay curves have been published. "This isotope has been included on radioisotope charts during the past few years but a very recent check of a complete list of all known radioisotopes soon to be published in *Reviews of Modern Physics* fails to show Calcium-41 listed. Therefore, we must conclude that this isotope does not exist."

Pardon us for asking, but what was decaying?

IT WAS ONLY last month that we were talking about anti-shark powder, which reminded us of the slightly daft British colonel. Seems we weren't up to date: A B. F. Goodrich friend reminds us that his company recently introduced an anti-deer formulation to repel these lovely creatures from the farmer's vegetable gardens.

Every once in a while—especially when we're trying to get downtown in a hurry to see a man about a hot news story—we get all fouled up in traffic and wish heavens-to-Betsy for a quart-size carton of anti-people powder.

ONE OF THESE DAYS we're going to get into our car, drive a couple of hundred miles, and end up with more gasoline in the tank than we started out with. We foresee this after reading a paper presented to the Society of Automotive Engineers in which the author cites nine ways of improving gasoline mileage. Adding up the minimum percentage gas savings for the nine, we get 111 per cent. Or if we add the maximum percentages, we get 258—enough to turn any 1929 Dodge into a respectable oil refinery.

NOW THEY'RE USING a fancy device to test footballs for leaks. They put a little Freon (or any halogen-containing gas) in the ball and test the surrounding atmosphere for minute traces of the gas. A leakage of 0.01 ounces per year can be detected in this manner.

Our Alma Mater had a poor football season last fall, and we're wondering if this device couldn't be used on the coach's head.

WE RECEIVED Lesson I of "Chemistry in the Home" last week. We insisted over our wife's protests that the chocolate frosting, which we were supposed to "cook until thick enough," was thick enough. We prattled knowingly of the inverse relationship of viscosity and temperature, reminded the little woman of our years of scientific training. It stayed liquid.

## *FIFTEEN YEARS AGO*

(From Our Files of Feb., 1934)

*The chemical industry feels that the proposed shipping code presents a serious economic danger. Under it all shippers, independent or belonging to the American Steamship Owners' Assoc., will be obliged to maintain conference rates, and competition will cease to exist. This would give chemical companies who do their own shipping a decided edge over those who do not.*

*Experiments are being carried out in Scandinavia on a process (the Nodon process) for the production of nitric acid from peat bogs by electrolysis. Vessels with cork in the bottom for anode are buried in the peat and connected by iron bars which act as cathode. When the current is closed the peat itself forms the true electrolyte.*

*Shellac prices skyrocket upwards in Calcutta and London and force sharp revisions in domestic quotations. Demand is in the varnish, gramophone and stiff hat industries, which have been experiencing a distinct revival.*

## *THIRTY YEARS AGO*

(From Our Files of Feb., 1919)

*Japanese imitations of American preparations are driving the originals out of the Chinese markets and will soon result in almost total elimination of American products unless drastic action is taken. The main factor in the growth of the business of Japanese imitations is lack of interest on the part of American manufacturers in protecting their trade-mark rights.*

*The Bureau of Standards plans to investigate safety codes for all plants manufacturing and handling heavy chemicals during the coming year. The investigations will cover plant arrangement, construction, and fire hazards.*

*Monsanto Chemical Works has bid $605,000 for the Heyden Chemical Works, Garfield, N. J. This was the highest bid received by the Alien Property Custodian's office, which holds Heyden. Second highest bidder was McKesson & Robbins.*

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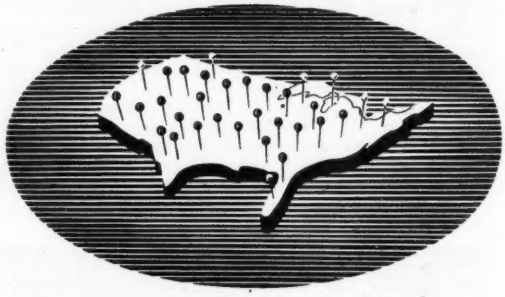

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# *Abstracts of U. S. and Foreign Patents*

**A Complete Checklist Covering Chemical Products and Processes**

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***U. S. Patents from Official Gazette—Vol. 615, No. 4; Vol. 616, Nos. 1, 2, 3, 4 (Oct. 26-Nov. 23)***
***Canadian Patents Granted and Published Nov. 16-23***

## *Organic

**Mixing a substance selected from the class consisting of diaryl substituted paraffins,** having at least 2 carbon atoms in the paraffin chain and in which both aryl groups are attached to the same carbon atom and their nuclear substituted derivatives with water vapor as a diluent, contacting the resulting mixture with a metal chromite catalyst, said metal having an atomic number from 23 to 29, inclusive, and maintaining the temperature at about 400° C.-650° C. during the time it is in contact with said catalyst. No. 2,450,334. James Kenneth Dixon and Donald R. May (to American Cyanamid Co.).

**Bis(2-hydroxy-3-nitro-5-chlorophenyl) sulfide.** No. 2,450,342. William F. Hester and W. E. Craig (to Röhm & Haas Co.).

**Manufacture of a 5-amino acridine** compound which consists in reacting a 5-acridyl ether with a salt selected from the group consisting of ammonium salts and salts of primary and secondary amines in an aqueous alcoholic reaction medium separating the 5-amino acridine salt and basifying the product to isolate the corresponding 5-amino acridine compound. No. 2,450,367. Harry James Barber (to May & Baker Ltd.).

**Manufacturing factice,** comprising reacting sulphur with a fatty oil in the presence of from ½ to 10% by weight of dicyclohexylamine. No. 2,450,384. Kenneth Charles Roberts (to The Anchor Chemical Co., Ltd.).

**In a process for the manufacture of compounds containing amidine groups** by reacting a nitrile of the general formula R.CN, where R is a member of the group consisting of alkyl, aryl, and aralkyl radicals and heterocyclic radicals in which the hetero atoms are nitrogen atoms and the unsatisfied valency bond is on a carbon atom, with a compound selected from the group consisting of urea, ammonia, and mono-functional primary and secondary amines of the aliphatic, araliphatic and aromatic series and of the heterocyclic series in which the hetero atoms are nitrogen atoms, the step which consists in promoting the reaction by the use of a substance selected from the group consisting of aluminum chloride, zinc chloride, ferric chloride, and stannic chloride. No. 2,450,386. Wallace Frank Short and Maurice William Partridge (to Boots Pure Drug Co., Ltd.).

**Continuous process for the manufacture of crotonic acid** by the oxidation of crotonaldehyde by means of molecular oxygen. No. 2,450,389. Karl Heinrich Walter Tuerck (to The Distillers Co., Ltd.).

**5-hydroxy-1,3,4-triazaindolizines as stabilizers** for photographic silver-halide emulsions. No. 2,450,397. Newton Heimbach (to General Aniline & Film Corp.).

**Reacting a quaternary ammonium salt** in which the heterocyclic nitrogenous ring contains only 5 atoms with a compound selected from the group consisting of thio acids having the grouping —COSH and salts of said acids. No. 2,450,400. Thomas Robert Thompson (to General Aniline & Film Corp.).

**Making a liquid highly sulfurized jojoba bean oil** which comprises heating jojoba bean oil and adding sulfur portionwise on the up-heat. No. 2,450,403. Franklin B. Wells (to Ellis-Foster Co.).

**Obtaining thiosemicarbazide, $NH_2NHCSNH_2$,** by reacting neutral hydrazine sulfate with an alkali metal thiocyanate. No. 2,450,406. Louis L. Bambas (to Parke, Davis & Co.).

**Separating valuable components** from a reaction mixture comprising HCl, HF, $CHClF_2$ and $CH_2ClF$, of the character of that obtained by the reaction of HF on $CHCl_3$. No. 2,450,414. Anthony F. Benning (to Kinetic Chemicals, Inc.).

**Separating valuable components from a reaction mixture comprising HCl, HF, $CCl_2F_2$ and $CCl_3F$,** of the character of that obtained by the reaction of HF on $CCl_4$. No. 2,450,415. Anthony F. Benning (to Kinetic Chemicals, Inc.).

**Phenoxyphenyl propyl amines.** No. 2,450,497. Robert Biedermann (to J. R. Geigy A.-G.).

**Ethers of 1-methylolcyclohexyl-cyclohexyl-carbinol.** No. 2,450,498. Joseph E. Bludworth and Donald F. Easter (to Celanese Corp. of America).

**Synthesis of normally liquid hydrocarbons** by passing a gaseous mixture comprising hydrogen and carbon monoxide over a series of hydrocarbon synthesis catalysts selected from the group consisting of cobalt, cobalt-thoria, nickel-thoria, iron and sintered iron and selected and arranged in separate zones across the line of gas flow in the order corresponding with the ascending order of temperature at which said selected catalysts inherently exhibit optimum activity in the synthesis of said hydrocarbons. No. 2,450,500. Alfred Clark (to Phillips Petroleum Co.).

**Sulfonating a mixture of alkyl aromatic hydrocarbons** which yields both preferentially water-soluble and preferentially oil-soluble alkyl aromatic sulfonic acids upon nonselective sulfonation, which comprises contacting said mixture with sulfuric acid having an initial strength between about 88 and about 98 weight per cent of sulfuric acid to effect substantial preferential sulfonation of alkyl aromatic hydrocarbons whose sulfonic acids are preferentially water-soluble, separating preferentially water-soluble alkyl aromatic sulfonic acids from the sulfonation reaction mixture, separating residual alkyl aromatic hydrocarbons from the sulfonation reaction mixture, and sulfonating said residual alkyl aromatic hydrocarbons with fuming sulfuric acid to produce preferentially oil-soluble alkyl aromatic sulfonic acids. No. 2,450,585. Edmond L. d'Ouville and Donald E. Burney (to Standard Oil Co.).

**In a process for the saccharification of plant material** the steps which include the progressive degradation of its cellulosic content in a plurality of successive stages with 1 to 6% sulfuric acid whereby pentosans are converted to pentoses and furfural and the cellulose is mildly degraded, drying to further degrade the cellulose molecules, mixing the dried residue with 80 to 87% sulfuric acid, whereby a free-flowing powder is obtained which upon hydrolysis will yield about 60% dextrose, subjecting said powder to mechanical mastication so as to develop continuously-changing directional pressures above substantially 100 pounds per square inch to convert it into a stiff plastic mass whereby the molecules are still further degraded, said mastication being arrested at a point just short of the formation of substantial amounts of dextrose. No. 2,450,586. John W. Dunning and Elbert C. Lathrop to U.S.A. by the Secretary of Agriculture).

**Selectively desulfurizing a non-viscous aromatic-containing hydrocarbon oil** by contacting with a solvent consisting of liquid anhydrous hydrogen fluoride, flashing off any hydrocarbon gases and hydrogen sulfide resulting from the conversion of sulfur compounds in said oil, cooling the flashed mixture, contacting the cooled mixture with additional liquid anhydrous hydrogen fluoride while maintaining a pressure sufficient to maintain the solvent and hydrocarbon oil in the liquid phase, permitting the mixture of said oil and liquid hydrogen fluoride to stratify into an aromatic-containing raffinate phase substantially free of sulfur and a sulfur-containing extract phase, separating said phases and removing the hydrogen fluoride from said phases. No. 2,450,588. Bernard L. Evering, Arthur P. Lien and James M. Page, Jr. (to Standard Oil Co.).

**Distillation apparatus for treating fatty acid containing stock.** No. 2,450,611. Ralph H. Potts (to Armour & Co.).

**Distillation of fatty acid stock** by fractionation and flash steps. No. 2,450,612. Ralph H. Potts (to Armour & Co.).

**Manufacturing a tetrabasic acid** by heating in the presence of an aqueous alkaline reagent the adduct of a dienophilic dibasic acidic compound and a cyclic polyolefinic hydrocarbon containing isolated unsaturation and at least some conjugated unsaturation, and acidifying the polymer product formed in the said seating step to form said tetrabasic acid. No. 2,450,627. Herman S. Bloch (to Universal Oil Products Co.).

**Production of aromatic nitriles** which comprises contacting an aromatic hydrocarbon containing at least 7 and up to 11, inclusive, carbon atoms per molecule, and having at least one nuclear hydrogen replaced by a univalent, aliphatic, non-acetylenic hydrocarbon radical, with ammonia in the presence of a catalyst comprising a molybdenum oxide. No. 2,450,632. Hamilton P. Caldwell, Jr., and Harold D. Chapman (to Socony-Vacuum Oil Co.).

**Preparing $\beta,\beta'$-thiodipropionic acid** which comprises reacting at atmospheric pressures acrylic acid in aqueous solution with sodium sulfide under alkaline conditions and in the absence of stabilizing agents. No. 2,450,634. Russell T. Dean and Edwin O. Hook (to American Cyanimide Co.).

**Production of nitriles having at least 2 carbon atoms per molecule** by contacting a cycloparaffinic hydrocarbon selected from the group consisting of dimethyl cyclohexane methyl cyclohexane and methyl decalin, with ammonia in the presence of a catalyst comprising a molybdenum oxide. No. 2,450,636. William I. Denton and Richard B. Bishop (to Socony-Vacuum Oil Co.).

**Production of nitriles** having at least 2 carbon atoms which comprises reacting an olefinic hydrocarbon containing up to about 10 carbon atoms, with ammonia, in the presence of a molybdenum oxide. No. 2,540,637. William I. Denton and Richard B. Bishop (to Socony-Vacuum Oil Co., Inc.).

**Production of nitriles having at least 2 carbon atoms per molecule,** which comprises contacting a paraffinic hydrocarbon containing at least 2 and up to about 10 carbon atoms per molecule, with ammonia, in the presence of a catalyst comprising a molybdenum oxide. No. 2,450,638. William I. Denton and Richard B. Bishop (to Socony-Vacuum Oil Co., Inc.).

**Production of aromatic nitriles,** which comprises contacting an aromatic hydrocarbon having at least one nuclear hydrogen replaced by a univalent, aliphatic, non-acetylenic hydrocarbon radical, and containing at least 7 and up to 11, inclusive, carbon atoms per molecule, with ammonia, in the presence of a catalyst comprising a vanadium oxide. No. 2,450,639. William I. Denton and Richard B. Bishop (to Socony-Vacuum Oil Co., Inc.).

**Production of nitriles having at least 2 carbon atoms per molecule,** which comprises contacting a cycloparaffinic hydrocarbon selected from the group consisting of dimethyl cyclohexane, methyl cyclohexane, methyl cyclopentane, and methyl dicalin, with ammonia, in the presence of a catalyst comprising a vanadium oxide. No. 2,450,640. William I. Denton and Richard B. Bishop (to Socony-Vacuum Oil Co., Inc.).

**Production of nitriles** having at least 2 carbon atoms per molecule which comprises contacting a paraffinic hydrocarbon containing at least 2 and up to about 10 carbon atoms per molecule, with ammonia, in the presence of a catalyst comprising a vanadium oxide. No. 2,450,641. William I. Denton and Richard B. Bishop (to Socony-Vacuum Oil Co., Inc.).

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* *U. S. Patents from Vol. 614, Nos. 2, 3, 4. Vol. 615, Nos. 1, 2, 3. Canadian from Oct. 12-Nov. 9.*

**Production of nitriles having at least 2 carbon atoms per molecule**, which comprises contacting an olefinic hydrocarbon containing up to about 10 carbon atoms per molecule, with ammonia, in the presence of a catalyst comprising a vanadium oxide. No. 2,450,642. William I. Denton and Richard B. Bishop (to Socony-Vacuum Oil Co., Inc.).

**Making a methyl beta-hydroxy-isopropyl ketone** by heating a mixture comprising methyl ethyl ketone, an aqueous formaldehyde solution, sodium hydroxide and sodium carbonate. No. 2,450,646. Robert R. Dreisbach and George Beal Heusted (to The Dow Chemical Co.).

**Obtaining alkyl benzenes substantially free of non-aromatic hydrocarbons** from a petroleum oil comprising a substantial amount of benzene and a substantial amount of non-aromatic hydrocarbons wherein the boiling points of the benzene and the non-aromatic hydrocarbons are so close together that they cannot be separated feasibly by conventional fractional distillation, which process comprises distilling the oil to prepare a fraction boiling below about 90° C., subjecting the fraction to selective alkylation with a single normally gaseous olefin in the presence of aluminum chloride so as to alkylate only the benzene, and then fractionally distilling the mixture formed by said alkylation step to produce a fraction reduced in benzene content boiling below 90° C., and a fraction boiling above 90° C., which consists of alkyl benzenes substantially free of non-aromatic hydrocarbons. No. 2,450,652. Alfred W. Francis and Carleton H. Schlesman (to Socony-Vacuum Oil Co., Inc.).

**Producing thiophene**, which comprises separately preheating sulfur and hydrocarbon material selected from the group consisting of normal butane, normal butenes and butadienes, to temperatures such that combining said sulfur and said hydrocarbon material will give a reaction mixture having a temperature varying between 850° F. and about 1400° F., mixing the preheated sulfur and the preheated hydrocarbon material, reacting said preheated sulfur with said preheated hydrocarbon material at temperatures varying between 850° F. and about 1400° F., for a period of time of not more than about one second to yield a thiophene-containing mixture, and reducing the temperature of straight chain. No. 2,450,685. Herbert E. Rasmussen and Rowland C. Hansford (to Socony-Vacuum Oil Co., Inc.).

**Producing valuable organic compounds from normal $C_4$-hydrocarbons**, which comprises separately preheating sulfur and a $C_4$-hydrocarbon selected from the group consisting of normal butane, normal butenes, and butadienes. No. 2,450,659. Rowland C. Hansford, Herbert E. Rasmussen, and Alexander N. Sachanen (to Socony-Vacuum Oil Co., Inc.).

**Production of nitriles having at least 2 carbon atoms per molecule**, by contacting an olefinic hydrocarbon containing up to about 10 carbon atoms, per molecule, with ammonia, in the presence of catalytic oxides obtained by treating a heteropoly compound containing an acid anhydride molecule selected from the group consisting of $MoO_3$, $WO_3$, and $V_2O_5$. No. 2,450,675. Milton M. Marisic, William I. Denton and Richard B. Bishop (to Socony-Vacuum Oil Co., Inc.).

**Production of nitriles having at least 2 carbon atoms per molecule**, which comprises contacting a paraffinic hydrocarbon containing at least 2 and up to about 10 carbon atoms, per molecule, with ammonia in the presence of catalytic oxides obtained by treating a heteropoly compound containing an acid anhydride molecule selected from the group consisting of $MoO_3$, $WO_3$ and $V_2O_5$. No. 2,450,676. Milton M. Marisic, William I. Denton and Richard B. Bishop (to Socony-Vacuum Oil Co.).

**Production of aromatic nitriles**, which comprises contacting an aromatic hydrocarbon having at least one nuclear hydrogen replaced by a univalent, aliphatic, non-acetylenic hydrocarbon radical, and containing at least 7 and up to 11, inclusive, carbon atoms per molecule, with ammonia, in the presence of catalytic oxides obtained by treating a heteropoly compound containing an acid anhydride molecule selected from the group consisting of $MoO_3$, $WO_3$, and $V_2O_5$. No. 2,450,677. Milton M. Marisic, William I. Denton and Richard B. Bishop (to Socony-Vacuum Oil Co., Inc.).

**Production of nitriles having at least 2 carbon atoms per molecule**, which comprises contacting a cycloparaffinic hydrocarbon selected from the group consisting of methyl cyclohexane, dimethyl cyclohexane, and methyl decalin, with ammonia, in the presence of catyltic oxides obtained by treating a heteropoly compound containing the acid anhydride molecule $MoO_3$. No. 2,450,678. Milton M. Marisic, William I. Denton and Richard B. Bishop (to Socony-Vacuum Oil Co., Inc.).

**Producing methyl thiophene**, which comprises separately preheating sulfur and hydrocarbon material selected from the group consisting of pentanes, pentenes, and pentadienes having at least 4 carbon atoms in a straight chain. No. 2,450,685. Herbert E. Rasmussen and Rowland C. Hansford (to Socony-Vacuum Oil Co., Inc.).

**Producing methyl thiophene** which comprises separately preheating sulfur and a hydrocarbon selected from the group consisting of pentanes, pentenes, and pentadienes, having at least 4 carbon atoms in a straight chain. No. 2,450,686. Herbert E. Rasmussen and Rowland C. Hansford (to Socony-Vacuum Oil Co., Inc.).

**Producing dimethyl thiophene and ethyl thiophene, which comprises** separately preheating sulfur and a hydrocarbon selected from the group consisting of hexanes, hexenes, and hexadienes, having at least 4 carbon atoms in a straight chain. No. 2,450,687. Herbert E. Rasmussen and Rowland C. Hansford (to Socony-Vacuum Oil Co., Inc.).

**Process for methylating methyl 6-hydroxydehydroabietate** which comprises reacting methyl-6-hydroxydehydroabietate with dimethyl sulfate in an aqueous alcoholic solution of an alkali metal hydroxide. No. 2,450,706. Harold H. Zeiss (to Ridbo Laboratories, Inc.).

**Method of recovering dextrins from stillage syrup comprising:** dialyzing syrup thru a membrane to remove some of its impurities; mixing the dialyzed syrup with a quantity of hydrochloric acid ranging approximately from 1 to 5 per cent by volume of the moisture content of the syrup; and mixing the acidified syrup with sufficient alcohol to place remaining impurities in solution and to precipitate the dextrins. No. 2,450,717. Harold W. Coles (to Joseph E. Seagram & Sons, Inc.).

**Preparing enol acetates** comprising condensing, in the presence of an acid catalyst, ispropenyl acetate with a compound selected from the group consisting of the α-diketones represented by the following general formula: $RCH_2(CO)_2R_1$ wherein R represents a member selected from the group consisting of a hydrogen atom and an alkyl group containing from 1 to 3 carbon atoms and $R_1$ represents a member selected from the group consisting of a primary alkyl group containing from 1 to 4 carbon atoms and an isopropyl group. No. 2,450,754. Hugh J. Hagemeyer, Jr. (to Eastman Kodak Co.).

**Conversion of normal butane to isobutane** which comprises passing a gaseous stream containing normal butane and catalyst-activating amounts of hydrogen chloride through a bed of solid anhydrous aluminum chloride at isomerization conditions of temperature and pressure. No. 2,450,764. Charles O. Meyers (to Phillips Petroleum Co.).

**1-alkyl cyclohexylcarbinyl esters of the thiocyano-substituted aliphatic acids.** No. 2,450,765. Rupert C. Morris, Alva V. Snider and Paul H. Williams (to Shell Development Co.).

**A 5-arylsulfamyl-2-mercapto-benzothioazole.** No. 2,450,777. Charles F. H. Allen and Alan Bell (to Eastman Kodak Co.).

**Composition to prevent the corrosion of metal surfaces** comprising the water-insoluble product obtained by heating 2-oleyl-4-methyl-4-hydroxymethyl-2-oxazoline with chromium trioxide and a light naphtha solvent. No. 2,450,806. Paul R. McCarthy (to Gulf Research & Development Co.).

**A chromium-containing product** obtained by heating an oxazoline compound with chromium trioxide. No. 2,450,807. Paul R. McCarthy (to Gulf Research & Development Co.).

**In the process for the recovery of protein** from a naturally occurring protein containing material selected from the group consisting of soya beans and peanuts involving dissolving the protein content of such materials in aqueous alkaline solution, separating the solution from insoluble material and precipitating protein from the resulting solution by acidification, the step which consists in incorporating a water soluble urea compound selected from the group consisting of urea, thiourea and their mono substituted derivatives into the protein solution. No. 2,450,810. Anita V. Luisada Opper and William P. ter Horst (to Virginia Carolina Chemical Corp.).

**Oxidizing relatively long chain unsaturated fatty bodies to produce relatively** short chain saturated fatty bodies by electrolyzing an aqueous solution containing sulphuric acid and chromium sulphate to liberate hydrogen and convert chromium sulphate to chromic acid and sulphuric acid, treating the fatty body with said solution to produce cleavage of the chain and separating the fatty bodies so treated from said solution. No. 2,450,858. J. D. Fitzpatrick and Latimer D. Myers.

**Preparing an organic sulfonamide** from an organic sulfonyl fluoride of an aromatic mineral oil hydrocarbon, which comprises: reacting said organic sulfonyl fluoride with urea. No. 2,450,863. Mario S. Altamura (to Socony-Vacuum Oil Co., Inc.).

**3-Tertiary-butyl-4-alkoxy benzaldehydes.** No. 2,450,877. Marion Scott Carpenter and William M. Easter, Jr. (to Burton T. Bush, Inc.).

**3-Tertiary-butyl-4-alkoxy-5-nitro benzaldehydes.** No. 2,450,878. Marion Scott Carpenter and William M. Easter, Jr. (to Burton T. Bush, Inc.).

**Preparing 2,4-di-tertiary-butyl-5-methoxy benzaldehyde** by treating 2,4-di-tertiary-butyl-5-methoxy toluene with manganese dioxide in the presence of sulfuric acid. No. 2,450,879. Marion Scott Carpenter and William M. Easter, Jr.

**Liquid phosphorus acid esters of petroleum phenols** having at least 11 carbon atoms and boiling above 150° C. at 6 mm. pressure, said esters being soluble in hydrocarbon oils at room temperature in all proportions. No. 2,450,903. Louis A. Mikeska (to Standard Oil Development Co.).

**Producing butadiene** by the catalytic dehydrogenation of butylene by heating the butylene, mixing butylene vapors with steam, passing the butylene-steam mixture into contact with an active dehydrogenating catalyst comprising $MgO$, $Fe_2O_3$, $CuO$ and $K_2O$ and having water gas activity. No. 2,451,040. Eger V. Murphree (to Standard Oil Development Co.).

**Preparing a compound soluble in hydrocarbon oil** by reacting one part of an unsaturated high molecular weight essentially hydrocarbon polymeric material characterized by having a substantially aliphatic linear chain structure with the unsaturation interspersed along the chain as double bonds and capable of reacting with sulphur. No. 2,451,048. William J. Sparks and Donald C. Field (to Standard Oil Development Co.).

**In the extraction and segregation of an olefin** where ammonia and a modifier that increases the solvent power of the ammonia is used as a solvent to obtain an extract of the olefin in the ammonia. No. 2,451,050. Carl O. Tongberg (to Standard Oil Development Co.).

**The product formed by adding copper acetate to a solution containing para-amino phenyl mercury lactate and lactic acid.** No. 2,451,052. Carl N. Anderson (to Gallowhur Chemical Corp.).

**Purifying crude phenothiazine** containing sulfur and an acidic catalyst which comprises agitating the crude phenothiazine with a dilute aqueous solution of an alkali and a water-soluble reducing agent selected from the group consisting of alkali metal sulfites, hydrosulfites and hydrosulfides, and subsequently, separating the phenothiazine. No. 2,451,082. Charles W. Gates and Cecil R. Howey (to U. S. Rubber Co.).

**Compounds of the formula:** Capryl-Ph-$OCH_2COOC_nH_{2n}(OC_nH_{2n})_mX$ wherein Ph is a phenyl nucleus, X is a haloid from the group consisting of chlorine, bromine, iodine, thiocyano- and cyano-groups, m is a number from zero to 2, inclusive, and $C_nH_{2n}$ is an alkylene chain of at least 2 carbon atoms in which n has a value of 2 to 3, inclusive. No. 2,451,085. William F. Hester and W. E. Craig (to Rohm & Haas Co.).

**Process for producing alcohol** from a nutrient medium by fermentation with yeast. No. 2,451,156. Annibal Ramos de Mattos.

**Preparing an aqueous emulsion of a butadiene-1,3 hydrocarbon,** adding to the water of said emulsion a simple ionizable salt of a metal occurring in group VIII of the periodic table, and polymerizing the butadiene-1,3 hydrocarbon in the aqueous emulsion in the presence of the added salt. No. 2,451,180. William D. Stewart (to The B. F. Goodrich Co.).

**1,1-difluoro-1,2-epoxy-2-methylpropane.** No. 2,451,185. Atherton M. Whaley.

**Production of sulfolane compounds** wherein a sulfolene compound is brought in contact in the liquid state, with hydrogen in the presence of an active nickel hydrogenation catalyst in the presence of sodium hydroxide. No. 2,451,298. Rupert C. Morris and Norten C. Melchior (to Shell Development Co.).

**3-sulfolanyl caproate.** No. 2,451,299. Rupert C. Morris and Edward C. Shokal (to Shell Development Co.).

**Alkyl esters of α-acylamino, α-cyano, β-(3 indole)-propionic acid.** No. 2,451,310. Noel F. Albertson, Sydney Archer and Chester M. Suter to Winthrop-Stearns, Inc.).

**Selective removal of acetylenes** from a gaseous hydrocarbon fraction containing diolefins by passing said fraction in the absence of hydrogen over a catalyst comprising an aluminum silicate selected from the group consisting of bentonite and montmorillonite and which has been previously treated with an acid selected from the group consisting of sulfuric acid, fluosilicic acid, and hydrofluoric acid whereby the acetylenes are selectively polymerized. No. 2,451,327. Egi V. Fasce and William H. Wood (to Standard Oil Development Co.).

**Preparing organic polyhydroxy compounds** by heating a mixture of formaldehyde, carbon monoxide, hydrogen and a reduced cobalt oxide hydrogenation catalyst under a pressure in excess of 100 atmospheres at a temperature within the range of 80° to 300° C. and thereafter separating organic polyhydroxy compounds from the resulting reaction product. No. 2,451,333. William F. Gresham and Richard E. Brooks (to E. I. du Pont de Nemours & Co.).

**Reaction of two molecules of a ketone** selected from the group consisting of alkyl, saturated cycloaliphatic and aralkyl ketones, which comprises preparing a vaporous mixture consisting of the ketone and hydrogen reacting in the presence of a catalyst consisting of an oxide of a metal selected from group II and an oxide of a metal selected from group V of the periodic table. No. 2,451,350. Henry O. Mottern and Vincent F. Mistretta (to Standard Oil Development Co.).

**Reaction of a saturated aliphatic methyl ketone** with a saturated aliphatic aldehyde which comprises preparing a vaporous mixture consisting of the ketone, the aldehyde and hydrogen, in the presence of a catalyst consisting of an oxide of a metal selected from group II and an oxide

of a metal selected from group V of the periodic table. No. 2,451,351. Henry O. Mottern and Vincent F. Mistretta (to Standard Oil Development Co.).

**Producing a hard, fatty product from tall oil** by forming a mixture of tall oil and 1,4-dioxane, hydrogenating the mixture in the presence of a finely divided metal catalyst at an elevated temperature and pressure. No. 2,451,377. Harding Bliss and William C. Sussky (to Dictaphone Corp.).

**Isomerizing 1,4-dicyano-2-butene** to 1,4-dicyano-1-butene by maintaining a solution of 1,4-dicyano-2-butene in a non-hydrolyzing reaction medium in liquid phase contact with a hydrogenating metal until 1,4-dicyano-1-butene is formed. No. 2,451,386. Glenn F. Hager (to E. I. du Pont de Nemours & Co.).

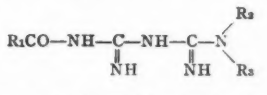
**Bis (2-chlorpolyhaloethyl) disulfide** containing 5 halogen atoms attached to each ethyl group of which at least 3 are fluorine atoms. No. 2,451,411. Maynard S. Raasch (to E. I. du Pont de Nemours & Co.).

**Hydroxythiophane carboxylic acids and esters** and methods of preparing same. No. 2,451,427. Bernard R. Baker (to American Cyanamid Co.).

**Dihydrothiophenes** and method of preparing same. No. 2,451,428. Bernard R. Baker (to American Cyanamid Co.).

**Thiophane carboxyhydrazides** and method of preparing the same. No. 2,451,429. Bernard R. Baker and Merle V. Querry (to American Cyanamid Co.).

**Manufacture of a high molecular guanamine** which comprises heating **an acyl biguanide** of the formula



wherein $R_1$ represents an alkyl radical containing from 8 to 18 carbon atoms, $R_2$ represents a member of the group consisting of alkyl, aralkyl, aryl, cycloakyl and heterocyclic radicals, and $R_3$ represents a member of the group consisting of hydrogen and alkyl, aralkyl, aryl, cycloakyl and heterocyclic radicals. No. 2,451,432. Jakob Bindler (to J. R. Geigy A. G.).

**Producing the enol lower alkyl thioethers of tetosterone-17-propionate** which comprises reacting reatosterone-17-propionate with a lower alkyl mercaptan in the presence of a dehydrating agent. No. 2,451,434. Louis Dorfman and Seymour Bernstein (to American Cyanamid Co.).

**Preparing an N-alkyl acrylamide** which includes heating an N-alkyl-β-alkylaminopropionamide in the presence of an acidic material which forms a stable amine salt with a primary or secondary alkyl amine at elevated temperature to produce an N-alkyl acrylamide and an alkyl amine salt, and distilling the thus formed N-alkyl acrylamide from the alkyl amine salt. No. 2,451,436. John G. Erickson (to American Cyanamid Co.).

**Production of an unsaturated carbonylic compound** of the group consisting of the unsaturated aldehydes and the unsaturated ketones by passing a gaseous mixture comprising an olefin containing at least 3 carbon atoms and oxygen into contact with a solid catalyst essentially comprising cuprous oxide. No. 2,451,485. George W. Hearne and Merrill L. Adams (to Shell Development Co.).

**Producing a metal salt of an oil-soluble sulfonic acid**, which comprises neutralizing an oil containing said oil-soluble sulfonic acid with a heterocyclic nitrogen base and reacting the nitrogen base sulfonate with a basic compound of a metal to replace the nitrogen base with the metal. No. 2,451,549. Felix C. Gzemski (to The Atlantic Refining Co.).

**Producing a starch hydrolyzing enzyme complex**, which comprises growing a culture of *Aspergillus niger* NRRL 337 under aerated submerged growth conditions, in a liquid medium comprising a mash of thin stillage, corn meal, and calcium carbonate. No. 2,451,567. Elmer H. Le Mense and James M. Van Lanen (to U. S. A. by the Secretary of Agriculture).

**4-halogenomethyl-1:8-naphthsultones.** No. 2,451,579. Guido Schetty (to J. R. Geigy A.-G.)

**Preparing a 4-alkyl-quinoline** which comprises reacting a hydrogen halide of a primary arylamine having at least one free ortho-position with an alkyl-vinyl-ketone in 95 per cent alcohol, in the presence of a stoichiometric quantity of ferric chloride to serve as an oxidizing agent and in the further presence of a catalytic quantity of a condensing agent comprising zinc chloride. No. 2,451,610. Kenneth Nielsen Campbell (to E. I. du Pont de Nemours & Co.).

**Preparing a 4-alkyl-quinoline**, which comprises condensing a primary arylamine having at least one free ortho-position with a 1,3,3-trialkoxyalkane in the presence of ferric chloride as an oxidizing agent. No. 2,451,611. Kenneth Nielsen Campbell (to E. I. du Pont de Nemours & Co.).

**Producing fluorohydrocarbons** by contacting a mixture of a compound of the class consisting of monovinylacetylene and monomethylvinylacetylene, and hydrogen fluoride in the vapor phase under substantially anhydrous conditions with a catalyst comprising an oxide of mercury, the monovinyl acetylene and hydrogen fluoride being mixed together only at the time they are brought in contact with the catalyst. No. 2,451,612. Donald D. Coffman and Leroy Frank Salisbury (to E. I. du Pont de Nemours & Co.).

**N-(β-hydroxyethyl)-tetraiodio-phthalimide.** No. 2,451,637. William H. Strain and Joseph Dec (to Eastman Kodak Co.).

**Minimizing the formation of color in protein** during isolation from oleaginous seed material by treating the material with a protein solvent, precipitating, and filtering and drying, which includes the steps of introducing an enzyme inhibiting agent and a blanketing agent, said blanketing agent comprising a liquid organic compound having low solubility in water, and capable of forming an adsorption compound with protein to exclude oxygen and to prevent molecular aggregation of the protein during drying. No. 2,451,659. Francis E. Calvert (to The Drackett Co.).

**Pentamethylphenyldisiloxane.** No. 2,451,664. William Herbert Daudt (to Corning Glass Works).

**Simultaneously producing acrolein and ethylene** which comprises flowing 2,3-dihydropyran through a heated reaction space. No. 2,451,712. John George Mackay Bremner and David Gwyn Jones (to Imperial Chemical Industries, Ltd.).

**Hydrogenating 1-alkoxy-3,7-dimethyl-6-hydroxy-9-trimethylcyclohexenyl-nonadiene-(2,7)-yne-4** to the corresponding triene- (2,4,7) and treating said triene with a minor amount of iodine to effect molecular rearrangement and dehydration to the corresponding ether of vitamin A. No. 2,451,735. Otto Isler (to Hoffmann-La Roche, Inc.).

**Treating an ether of 1-hydroxy-3,7-dimethyl-6-hydroxy-9-trimethyl-cyclohexenyl-nonadiene-(2,7)-yne-(4)** to produce a vitamin A ether, which process comprises a partial hydrogenation to convert the triple bond to a double bond and an allyl rearrangement effected by the action of an agent selected from the group consisting of halides and anhydrides of

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acetic, benzoic and phthalic acids. No. 2,451,736. Otto Isler (to Hoffmann-La Roche, Inc.).

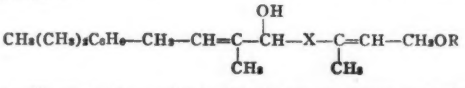
Treating a member secured from the group consisting of alkyl, aryl and aralkyl 1-ethers of 1-hydroxy-3,7-dimethyl-6-hydroxy-9-trimethyl-cyclohexenyl-nonadiene-(2,7)-yne-(4) with a minor amount of iodine to effect molecular rearrangement and dehydration to the corresponding 1-ether of 1-hydroxy-3,7-dimethyl-9-trimethyl-cyclohexenyl-nonatriene-(2,6,8)-yne-(4). No. 2,451,737. Otto Isler (to Hoffmann-La Roche, Inc.).

Treating a member selected from the group consisting of alkyl, aryl, and arakyl 1-ethers of 1-hydroxy-3,7-dimethyl-6-hydroxy-9-trimethyl-cyclohexenyl-nonadiene-(2,7)-yne-(4) which comprises a partial hydrogenation to convert the triple bond to a double bond and an allyl rearrangement effected by means of a carboxylic acid selected from the group consisting of formic acid, glycolic acid, phthalic acid, trichloracetic acid, malonic acid, oxalic acid and salicyclic acid. No. 2,451,738. Otto Isler (to Hoffmann-La Roche, Inc.).

Hydrogenating and rearranging and dehydrating a compound from the group consisting of 1-hydroxy-3,7-dimethyl-6-hydroxy-9-[2',6',6'-trimethyl-cyclohexene-(1')-yl]-nonadiene-(2,7)-yne-(4) and 1-acetoxy-3,7-dimethyl-6-hydroxy-9-[2',6',6'-trimethyl-cyclohexene-(1')-yl]-nonadiene-(2,7)-yne-(4). No. 2,451,739. Otto Isler (to Hoffmann-La Roche, Inc.).

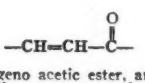
Condensing β-ionone with a halogeno acetic ester and reacting the condensation product with an alkaline agent. No. 2,451,740. Herbert Lindlar (to Hoffmann-La Roche, Inc.).

Manufacture of unsaturated compounds comprising reacting a compound of the formula:



wherein X stands for a radical selected from the group consisting of —CH=CH— and —C≡C—, and R represents a low alkyl radical, with an iodo compound easily splitting off iodine in order to bring about allyl rearrangement and dehydration. No. 2,451,741. Walter Huber (to Hoffmann-La Roche, Inc.).

Condensing an ionone other than β-ionone, and having the characteristic side chain



(lower alkyl) with a halogeno acetic ester, and reacting the condensation product with an alkaline agent to produce a corresponding buten-(2)-al-(1) having the characteristic corresponding side chain —$CH_3$—CH=C(lower alkyl)—CHO. No. 2,451,742. Herbert Lindlar (to Hoffmann-La Roche, Inc.).

Manufacture of a compound having the amidine grouping —C(:NH)$NH_2$ comprising heating a mixture of reactants consisting of ammonia and an N-substituted amidine of the general formula $R.C(:NR_1)NR_2R_3$ where R is a member of the group consisting of monovalent radicals of the aliphatic, araliphatic and aromatic series and of the heterocyclic series wherein the hetero-atoms are nitrogen atoms and the unsatisfied valency bonds are on carbon and $R_1$, $R_2$ and $R_3$ are members of the group consisting of hydrogen atoms and monovalent radicals of the aliphatic, araliphatic and aromatic series and of the heterocyclic series wherein the hetero-atoms are nitrogen atoms and the unsatisfied valency bonds are on carbon, one of said reactants being present in the form of salt. No. 2,451,779. Wallace Frank Short and Peter Oxley (to Boots Pure Drug Co., Ltd.).

Hydrocarbon sulphon-N-chloramide of the general formula: $R-(SO_2NYCl)_n$ wherein R is a saturated hydrocarbon radical selected from the group consisting of saturated aliphatic and cycloaliphatic hydrocarbon radicals, Y is a member of the group consisting of chlorine and saturated aliphatic hydrocarbon radicals and n is an integer. No. 451,817. Max Engelmann (to Canadian Industries, Ltd.).

Process of recovering adipic acid and hexamethylene diamine suitable for reuse from polymeric hexamethylene adipamide waste, which comprises repeatedly hydrolyzing a mass containing the said adipamide with a mineral acid, and removing the adipic acid from the hydrolyzed mixture of each hydrolyzing step. No. 451,822. Clovis D. Myers (to Canadian Industries, Ltd.).

Alcoholysis of a lower alkyl ester of a substituted acetic acid having the empirical formula $ROCH_2COOX$ in which R is a radical selected from the group consisting of hydrogen, alkyl and alkoxy-alkylene groups and X is an alkyl group with a glycerol ether. No. 451,842. Donald John Loder and Wilber Otis Teeters (to Canadian Industries, Ltd.).

Manufacture of a polymerizable unsaturated aliphatic acid from acrolein and alpha-substituted derivatives thereof by oxidation with molecular oxygen to produce a reaction mixture containing said acid and high-boiling by-products which tend to promote polymerization of said acid, the steps of subjecting the said reaction mixture directly to simple distillation in the presence of a diluent of such volatility as not greatly to alter the boiling point of the reaction mixture so that the distillate contains said unsaturated acid together with a considerable proportion of said diluent and maintaining the concentration of said unsaturated acid in the boiling liquid below about 40% by weight throughout the distillation. No. 451,857. Hans Peter Staudinger, Karl Heinrich, Walter Tuerck and Eric Harvey Brittain (to The Distillers Co., Ltd.).

Unsymmetrical methylene bis-α-azoles containing a single heteronitrogen atom having a double bond attached thereto. No. 451,859. Cyril D. Wison (to Du Pont Film Mfg. Corp.).

Preparing aldehydes by heating an alkyl-substituted ethylene having from 3 to 6 carbon atoms per molecule with carbon monoxide and hydrogen, the initial molal ratio of $CO:H_2$ being from about 1:1·5 to about 1:10, at a temperature within the range of 75° to 250° C. under a pressure of 325 to 1,500 atmospheres in the presence of a hydrogenation catalyst whereby a product containing an aldehyde is produced. No. 451,860. William Franklin Gresham, Richard Ensign Brooks and Walter Martin Bruner (to E. I. du Pont de Nemours & Co.).

Manufacture of 2-methyl-3-carbalkoxy-4-phenoxymethyl-5-cyanopyridone-(6), comprising treating alpha-cyano-beta-phenoxymethyl-gamma-acetyl-glutaric acid mono-alkyl-ester mononitrile with a strong acid. No. 451,880. Max Hoffer (to Hoffman La Roche, Ltd.).

Recovering phenol from a phenolic-brine mixture resulting from the neutralization of sodium phenolate with acid in a commercial monochlorobenzene synthetic phenol production process comprising subjecting said phenol-brine mixture to a settling step separating it into a phenol-rich upper layer and a brine-rich lower layer, heating said brine-rich lower layer, maintaining a salt concentration in said lower layer of at least 15%, subjecting said brine-rich lower layer to a fractional distillation step, producing an overhead comprising a phenol-water distillate free of salt and a bottoms product comprising brine free of all but a trace of phenol, condensing said phenol-water distillate to produce a phenol-rich lower layer and a water-rich upper layer, returning said water-rich upper layer to said fractional distillation step as reflux, and delivering said first-named phenol-rich upper layer and said last-named phenol-rich lower layer to a recovery system. No. 451,889. Marcel Jean Paul Bogart and Austin Schiffer Brunjes (to The Lummus Co.).

Production of a carbonylic compound which comprises reacting a monoolefine halide which contains at least 4 carbon atoms, wherein the olefinic carbon atoms are of the group consisting of primary and secondary olefinic carbon atoms, and wherein at least one of the olefinic carbon atoms is directly linked to a halogen atom, with a concentrated aqueous solution of a strong mineral oxy acid. No. 451,914. Harry De V. Finch and Kenneth E. Marple (to Shell Development Co.).

Preparing methyl ethyl ketone from 2-chlorobutene-2 which comprises reacting 2-chlorobutene-2 and water in the presence of a solid hydration agent containing a phosphoric acid as the active ingredient. No. 451,915. John Anderson, Raymond M. Stager, Jr., and Sumner H. McAllister (to Shell Development Co.).

Recovering aromatic hydrocarbons substantially free from non-aromatic hydrocarbons from a mixture of aromatic and non-aromatic hydrocarbons which comprises extracting the mixture with a solvent having preferential solvent power for aromatic hydrocarbons to form a primary raffinate phase and a primary extract phase separating the phases, bringing said primary extract phase without removal of solvent therefrom into intimate contact with a non-aromatic hydrocarbon diluent having a boiling range different from those of the solvent and the hydrocarbons in the primary extract phases whereby secondary raffinate and extract phases are formed, removing the solvent and the non-aromatic hydrocarbon diluent from the secondary extract phase, and recovering a substantial pure aromatic fraction from the remainder of the secondary extract phase by distillation. No. 451,921. Herbert H. Heier (to Standard Oil Development Co.).

Recovering xylene from hydrocarbons which comprises distilling said oil and rectifying the distilled vapours in the presence of methanol. No. 451,985. Stuart P. Miller (to Allied Chem. & Dye Corp.).

Manufacture of a 4-arylpiperidine by condensing an α-arylated tertiary δ amino fatty acid nitrile with a reactive ester of an alkylene-1:2-diol in the presence of an acid binding agent. No. 452,018. Karl Miescher and Hans Kaegi (to Ciba Ltd.).

Manufacture of hydroxyhydrophenanthrene-carboxylic acids and their derivatives by reacting a 1-keto-hydrophenanthrene which contains in the 2-position a functionally transformed carboxyl group in addition to a hydrocarbon radical and in the 7-position a member of the group consisting of a phenolic hydroxyl and a grouping which is convertible into a phenolic hydroxyl, with an organo-metallic compound for the purpose of introducing a hydrocarbon radical into the 1-position and subjecting the product obtained to a treatment suitable for removing the new tertiary hydroxyl group. No. 452,019. Karl Miescher, Jules Heer, and Jean Rene Billeter (to Ciba Ltd.).

In a process of araomatizing hydrocarbons, subjecting a naptha containing non-benzenoid hydrocarbons to a temperature of 375-675° C. and the action of an oxide contact-mass formed from co-precipitation from dissolved salts of chromium and an amphoteric oxide forming element from the group consisting of beryllium and aluminum, and an acid oxide forming element from the group consisting of tin and antimony. No. 452,067. Robert E. Burk and Everett C. Hughes (to Standard Oil Co., Ohio).

Process of converting hydrocarbons to aromatics, which comprises subjecting non-benzenoid hydrocarbons to the action of a temperature of 700-1250° F. and a contact-mass of copper oxide with the remaining per cent of co-precipitated gel type oxides of aluminum and chromium in which the aluminum oxide is predominant. No. 452,068. Robert E. Burk and Everett E. Hughes (to Standard Oil Co. Ohio).

Improvements in the separation and concentration of diolefins from hydrocarbon mixtures which comprises contacting a hydrocarbon mixture containing diolefins with a strongly basic ammoniacal cuprous solution. No. 452,069. Charles E. Morrell and Miller W. Swaney (to Standard Oil Development Co.).

Improvements in the separation and concentration of a secondary olefin from a hydrocarbon mixture containing the said secondary olefin which comprises contacting a hydrocarbon mixture containing a secondary olefin with sulfuric acid of about 75-90% concentration thereby forming a solution of the secondary olefin in said acid, solution by means of a saturated hydrocarbon compound, the said saturated hydrocarbon compound having at least 20° C. difference in boiling point from the secondary olefin, capable of dissolving the secondary olefin and separable from the said secondary olefin by fractionation. No. 452,070. Harold W. Scheeline (to Standard Oil Development Co.).

Separation and segregation of a diolefin from a hydrocarbon mixture containing a diolefin and a mono-olefin which comprises contacting a mixture of hydrocarbons containing a diolefin and a mono-olefin with a cuprous salt solution in which the diolefin is more soluble than the mono-olefin. No. 452,071. Adolph L. Antonio (to Standard Oil Development Co.).

In a process for regenerating spent aqueous alkaline solution containing mercaptans, extracted from hydrocarbons, the improvement comprising treating the said spent solution with a free oxygen-containing gas in the presence of a phenolic oxidation catalyst, thereby oxidizing said mercaptans to organic disulfides. No. 2,451,817. Lloyd C. Fetterly (to Shell Development Co.).

Monovinylphenoxthine. No. 2,451,818. Ralph G. Flowers and Leola W. Flowers (to General Electric Co.).

Process for the manufacture of at least one chloride of methane from methane which comprises maintaining said methane in contact with a chlorinating agent consisting of mercuric chloride vapor and for a contact time such that not more than 90% of said mercuric choride is converted to metallic mercury and recovering said chloride of methane from the gaseous effluent of said reaction zone. No. 2,451,821. Everett Gorin (to Socony-Vacuum Oil Co.).

Auro-thio-glycolic-acid-anilide. No. 2,451,841. Mozes Juda Lewenstein.

Producing 1-fluoro-3, 3-dimethylbutane by reacting ethylene, isobutylene and hydrogen fluoride. No. 2,451,843. Carl B. Linn and Louis Schmerling (to Universal Oil Products Co.).

N-beta-cyanoethyl substituted allylamine. No. 2,451,852. William M. McLamore (to Shell Development Co.).

Separating capryl alcohol from methyl hexyl ketone which comprises heating under anhydrous conditions a mixture of said compounds with a condensing agent of the group consisting of the oxides, hydroxides, alkoxides, and amides of sodium, potassium and lithium to change the ketone to polymeric form, and separating the capryl alcohol from the polymeric ketone. No. 2,451,857. John J. Miskel and Bernard A. Dombrow (to Nopco Chemical Co.).

Production of peroxidic compounds selected from the group consisting of tertiary butyl hydroperoxide, di(tertiary butyl), peroxide and mixtures thereof, the steps of continuously conveying a vaporous mixture comprising substantially equivolumetric vaprous amounts of isobutane and oxygen hydrogen bromide to effect the oxidation of the isobutane to said peroxidic compounds and periodically interrupting said oxidation step to reactivate the reaction vessel walls by subjecting them to the

action of nitrogen dioxide. No. 2,451,869. John C. Rapean and William E. Ross (to Shell Development Co.).

**Dimethyl germanium dichloride.** No. 2,451,871. Eugene G. Rochow (to General Electric Co.).

**In a process for the preparation of an N-ethyl diethanolamine substantially free from O-alkylated derivatives** the step which comprises subjecting a diethanolamine to a reaction with diethyl sulfate in the presence of an aqueous solution of sodium carbonate. No. 2,451,942. William F. Gresham (to E. I. du Pone de Nemours & Co.).

**Producing a potassium alcoholate** which comprises reacting potassium carbonate with an alcoholate selected from the class consisting of calcium and sodium alcoholates in an inert diluent which is a solvent for the potassium carbonate and a non-solvent for sodium and calcium carbonate. No. 2,451,945. William E. Hanford (to General Aniline & Film Corp.).

**Producing an acetal** by reacting an alcohol with an aldehyde in the presence of a naturally occurring argillaceous adsorbent which has been thermally activated. No. 2,451,949. Heinz Heinemann (to Porocel Corp.).

**Manufacture of phenols or salts thereof** which comprises, preparing an intimate solid mixture of an alkali metal salt of the sulphonic acid, a caustic alkali, and an additional solid substance consisting of finely powdered carbon in such proportion that during the subsequent heating operation the reaction mixture does not froth or swell. No. 2,451,996. Daniel Tyrer.

**Production of carbalkoxyamide (9-phenyl-phenanthridinium) salts,** wherein a corresponding amino-9-phenyl-phenanthridinium salt is reacted with a haloformic ester. No. 2,452,001. Leslie Percy Walls (to The Imperial Trust for the Encouragement of Scientific and Industrial Research).

**Preparation of zinc propionate** by reacting propionic acid with metallic zinc. No. 2,452,003. Arthur George Weber and Clement H. Hamblet (to E. I. du Pont de Nemours & Co.).

**As a new chemical compound,** a compound selected from the group consisting of 3,3,5,5,3',3',5',5'-octa(beta-cyanoethyl)-4,4'-diketodicyclohexyl; bis [3,3,5,5 tetra(beta-cyanoethyl)-4-ketocyclohexyl] methane; and 2,2 bis - [3,3,5,5, tetra(beta - cyanoethyl)-4-ketocyclohexyl] propane. No. 2,452,012. Paul J. Flory (to Wingfoot Corp.).

*Canadian*

**Recovery of a nitration-pure aromatic hydrocarbon** of the benzene series from an oil containing the same and higher, lower and like boiling non-aromatic hydrocarbons, including a substantial proportion of like-boiling olefins, which comprises fractionally distilling said aromatic oil and in this distillation taking off an oil fraction having an end boiling point in degrees Centigrade not more than 1.06 times the boiling point in degrees Centigrade of said aromatic hydrocarbon, azeotropically distilling said oil fraction with fractionation of the distilled vapours in the presence of methyl ethyl ketone and water. No. 451,767. John W. Waldron (to The Barrett Co.).

**Recovery of toluene** from a toluene fraction containing the same and containing non-aromatic hydrocarbons boiling from said fraction in the same temperature range as the toluene boils therefrom which comprises azeotropically distilling said toluene fraction in the presence of a ketone having the formula

$$C_2H_5—CO—R$$

in which R is an unsubstituted alkyl radical containing no more than 2 carbon atoms, and thereby vaporizing said ketone and non-aromatic hydrocarbons present in said toluene fraction. No. 451,768. Charles R. Clark (to Allied Chemical & Dye Corp.).

**Producing choline chloride** by reacting trimethylamine with ethylene chlorohydrin in an organic solvent. No. 451,769. Gustaf H. Carlson and Sidnay D. Upham (to Lederle Laboratories, Inc.).

**Preparing 4,6-dinitro-ortho-cresol** by adding sulphuric acid of at least 75 per cent strength to ortho-cresol, then reacting in dilute solution with at least two molecular equivalents of nitric acid and separating and washing said product by agitation in a molten condition with hot water. No. 451,794. William Frederick Filbert (to Canadian Industries, Ltd.).

**Nitrating solid polyhydroxy alcohols,** which comprises dissolving the polyhydroxy alcohol in a medium containing essentially water and a diluent taken from the group comprising sulphuric acid, acetic acid and phosphoric acid and then nitrating the resultant alcohol-containing solution with a nitric-sulphuric acid mixture. No. 451,797. Charles Philip Spaeth (to Canadian Industries, Ltd.).

**Production of thiols** by bringing a compound selected from the class consisting of organic sulphur compounds in which the sulphur is joined to the organic radical by a plural bond, organic sulphur compounds in which the sulphur forms the bridge between organic radicals, and organic sulphur compounds containing a sulphur-oxygen bond in which the sulphur is linked directly to an organic radical into contact with hydrogen, in the presence of a catalyst containing iron sulphide. No. 451,798. Herbert Giles Tanner (to Canadian Industries, Ltd.).

**Preparing tertiary N-carbamidomethylamines** which comprises reacting an acyclic urea having at least one hydrogen or urea nitrogen, any remaining valences of the urea nitrogens being satisfied by monovalent hydrocarbon radicals with a secondary amine free from reactive groups other than the amino group and an aldehyde containing in addition to aldehyde oxygen, only carbon and hydrogen. No. 451,800. William James Burke (to Canadian Industries, Ltd.).

**Aliphatic monoaminomonoacyl compound** having a chain length of at least 16 atoms, selected from the class consisting of carbon atom chains and chains containing in addition to carbon an atom from the group consisting of oxygen and sulphur, the amino group being attached to a carbon atom in the chain which is separated from the acyl carbon by a chain of two to three atoms selected from the class consisting of carbon atom chains and chains containing in addition to carbon an atom from the group consisting of oxygen and sulphur. No. 451,805. Hugh William Gray (to Canadian Industries, Ltd.).

**Producing aliphatic dibasic acids** which comprises subjecting a saturated alicyclic alcohol, dissolved in a substantial proportion of a solvent therefor, to liquid-phase oxidation at an oxidizing temperature by means of an oxygen-containing gas in the presence of an oxidation catalyst and an oxidation initiator selected from the group consisting of peroxides and compounds capable of forming peroxides under the reaction conditions. No. 451,806. Arthur George Weber (to Canadian Industries, Ltd.).

**Preparation of an oxygenated nitrile** which comprises contacting an alpha beta unsaturated organic acid nitrile with water. No. 451,809. William Franklin Gresham (to Canadian Industries, Ltd.).

**Making a monomeric ester of the hypothetical ethylidene glycol** and an acid selected from the group consisting of acrylic and methacrylic acids comprising the steps of introducing an non-polymerizing catalyst selected from the group consisting of mercuric sulphate and boron trifluoride into the selected acid of said group and adding acetylene to the acid in the presence of the catalyst and pyrogallol which is present as a polymerization inhibitor. No. 451,810. Loring Coes, Jr. (to Norton Co.).

**Recovering tertiary olefins** from alkyl phenols comprising the steps of heating an alkyl phenol to decompose it and sweeping the olefin resulting from said decomposition out of said liquid phase by means of an inert gasiform agent. No. 452,072. Oliver H. Dawson (to Standard Oil Development Co.).

**Improvement in the process of using a preferential solvent to separate a diolefin from a mixture of saturated and unsaturated hydrocarbons** containing a diolefin and acetylenes, which comprises contacting the said preferential solvent for the diolefin with another solvent capable of dissolving and extracting from the preferential solvent acetylene polymers which accumulate in the preferential solvent that has extracted the diolefin and acetylenes from said mixture. No. 452,073. Charles E. Morrell and Miller W. Swaney (to Standard Oil Development Co.).

**Improvement in the separation of olefins** from mixtures of hydrocarbons using a cuprous salt solution as the absorption medium which comprises treating the said mixture of hydrocarbons containing diolefins and acetylenes with a cuprous salt solution separating the cuprous salt solution with the acetylenes and diolefin dissolved therein, heating the cuprous salt solution to separate the diolefin and to form polymers, treating the said cuprous salt solution containing the polymers with a solid material having high adsorption capacity, separating the solid material and continuing the use of the cuprous salt solution in the said separation of diolefins. No. 452,075. Charles E. Morrell, James K. Small, and James H. McAteer (to Standard Oil Development Co., Ltd.).

**In a process of separating and segregating a $C_5$ to $C_6$ diolefin** from a hydrocarbon mixture containing acetylenes, the step which comprises contacting the mixture of hydrocarbons with a cuprous salt solution containing sufficient free ammonia to solubilize the cuprous salt present and cuprous acetylides formed in the solution, the free ammonia being the amount of ammonia in addition to that combined with the cuprous salt and its anion radical, restricting the amount of cuprous salt solution contacted with the hydrocarbon mixture so that it is not over that required to dissolve the acetylenes and leaves the diolefin undissolved, and separating the undissolved diolefin from the resulting cuprous salt solution containing the dissolved acetylenes. No. 452,076. Charles E. Morrell and Miller W. Swaney (to Standard Oil Development Co.).

**Amylthiomethyl octyl phenol.** No. 452,079. Rush F. McCleary and Stiles M. Roberts (to Texaco Development Corp.).

**Preparing an alkylated aliphatic compound** by reacting an alkyl aluminum halide with an aliphatic halide in a reaction mixture in which the reactive materials consist essentially of said alkyl aluminum halide and said aliphatic halide to replace a halogen of said aliphatic halide with an alkyl radical of said alkyl aluminum halide. No. 452,080. Robert Thomas Sanderson (to Texaco Development Corp.).

**Recovery of benzene** from a benzene fraction which comprises distilling said benzene fraction and rectifying the distilled vapors in the presence of butyraldehyde. No. 452,122. Richard B. Greenburg (to Allied Chem. & Dye Corp.).

**Recovery of xylene** from a xylene fraction by distilling and rectifying the distilled vapors in the presence of substantially anhydrous morpholine. No. 452,123. Richard B. Greenburg (to Allied Chem. & Dye Corp.).

**Recovery of benzene** from a benzene fraction by distilling and rectifying the distilled vapors in the presence of ethyl formate. No. 452,124. Richard B. Greenburg (to Allied Chem. & Dye Corp.).

**Recovering pure beta-picoline** from basic oil mixtures containing beta- and gamma-picoline comprising combining the gamma-picoline with a cyclic aldehyde by heating the basic oil mixture with said cyclic aldehyde in the presence of acetic anhydride and thereafter separating unchanged beta-picoline from the reaction mixture. No. 452,198. George Riethof (to Pittsburgh Coke & Iron Co.).

**Producing monohaloakane derivatives** by reacting a monohaloakane with an aliphatic mono-olefin in the presence of a Friedel-Crafts type metal halide catalyst. No. 452,205. Louis Schmerling (to Universal Oil Products Co.).

**An improved process for the neutralization of aromatic sulfonic acids** which comprises mixing an aromatic sulfonic acid with an alkali metal sulfite in the presence of liquid water and recovering the alkali aromatic sulfonate produced. No. 452,269. Stuart P. Miller (to Allied Chemical & Dye Corp.).

**Production of a high-purity relatively low-boiling aromatic hydrocarbon** and the corresponding sulfonic acid, said hydrocarbon being selected from the group consistnig of relatively low-boiling unsubstituted aromatic hydrocarbons and relatively low-boiling aromatic hydrocarbons substituted in the nucleus by a saturated side chain, which process comprises subjecting vapors of a less pure, relatively low-boiling aromatic hydrocarbon selected from the above group containing like-boiling paraffinic hydrocarbons to contact with a body of liquid sulfuric acid of sulfonating strength at a temperature not below the boiling point of the hydrocarbon at the pressure employed, withdrawing the aromatic hydrocarbon sulfonic acid, condensing unreacted aromatic hydrocarbon vapors, separating water from the condensate, vaporizing the aromatic hydrocarbon condensate thus separated, recycling said vapors through the sulfuric acid, continuing until the paraffin content of the aromatic hydrocarbon being recycled builds up substantially, and then subjecting this recycled aromatic hydrocarbon containing like-boiling paraffinic hydrocarbons to azeotropic distillation. No. 452,270. David F. Gould (to Allied Chemical & Dye Corp.).

**In the process of removing oils or fats from substantially fresh or undecomposed vegetable or animal matter,** the step which comprises carrying out at least part of the oil removal in the presence of alkali metal sulfite. No. 452,316. Kenneth C. D. Hickman (to Distillation Products, Inc.).

**A polymerizable vinyl aromatic compound** in which polymerization is inhibited by an alkoxyhydroquinone. No. 452,350. Edwin R. Erickson (to Mathieson Alkali Works).

**Production of 4:4'-diamidinostilbene-di-γ-hydroxypropane-sulfonate,** by reacting 4:4'-diamidino-stilbene with γ-hydroxy-propane-sulfonic acid. No. 452,353. George Newbery and Alexander Peter Tawse Easson (to May & Baker, Ltd.).

**Converting an amidoxime to a corresponding amidine** by reducing the =NOH group of such amidoxime to an imino group by hydrogenating the amidoxime in the presence of a metal hydrogenation catalyst. No. 452,354. Harry James Barber and Alan David Henderson Self (to May & Baker, Ltd.).

**Carrying out Friedel-Crafts alkylations of aromatic compounds** to conserve catalyst with reactants tending to deactivate the catalyst which comprises conducting partial reactions in separate units by passing concurrently a liquid mixture of alkyl chloride and aromatic hydrocarbon through at least 3 successive stationary portions of aluminum chloride catalyst of increasing catalytic activity. No. 452,358. George Lester Magoun (to Monsanto Chemical Co.).

**Production of monethyl benzene** by reacting benzene with ethylene in the presence of a Friedel-Crafts catalyst. No. 452,385. Eldon E. Stahly (to Standard Oil Development Co.).

**Production of mono-ethyl benzene** by reacting ethylene and benzene in

the presence of a catalyst comprising an aluminum halide and a hydrogen halide. No. 452,386. Charles N. Kimberlin, Jr. (to Standard Oil Development Co.).

**Process for continuously alkylating aromatic hydrocarbons.** No. 452,387. Charles N. Kimberlin, Jr. (to Standard Oil Development Co.).

**Improved alkylation of aromatics with recovery of unreacted aromatics.** No. 452,388. Charles N. Kimberlin, Jr. (to Standard Oil Development Co.).

**Reacting at elevated temperatures aliphatic aldehydes** containing 1-5 carbon atoms in the molecule, with compounds having the general formula $R.CO.(NH.C_xH_{2x})_n.OH$ in which R represents any alkyl or hydroxy-substituted alkyl chain of a fatty acid containing at least 7 carbon atoms, x represents a number from 2-5 inclusive, and n represents a number from 1-4 inclusive, and sulfonating the resulting product. No. 452,474. Ernst Alfred Mauersberger (to Alframine Corp.).

**Recating at elevated temperatures** organic sulfonic acid salts of amino alcohols having at least one member of the group consisting of primary and secondary amino group and having at least one free hydroxy group with higher fatty acids. No. 452,478. David Walker Jayne, Jr., and Harold Milton Day (to American Cyanamid Co.).

**Production of alpha-halogen-beta-hydroxy propion-aldehyde** by reacting acrolein with hypohalogenous acid. No. 452,513. Hanns Peter Staudinger and Karl Heinrich Walter Tuerck (to Distillers Co., Ltd.).

**An ether** having the general formula $R_1R_2C{=}CR_3(CH_2)_nOR_4$ in which $R_1$ and $R_2$ denote radicals selected from the group consisting of hydrogen and alkyl radicals containing not more than 4 carbon atoms, $R_3$ denotes an alkyl radical containing not more than 6 carbon atoms, $R_4$ denotes an aliphatic hydrocarbon radical containing from 6-22 carbon atoms, and n is a whole number from 1-3. No. 452,539. Donald Price and Bernard A. Dombrow (to National Oil Products Co.).

**Water-soluble salt of sulfonated methallyl lauryl ether.** No. 452,541. Donald Price and Bernard A. Dombrow (to National Oil Products Co.).

**Making a methyl-4-amino-1-naphthol** by treating a 1-nitro naphthalene having a methyl group at the 2 or 3 position with a mild reducing agent to obtain the corresponding hydroxylamino compound, rearranging with dilute sulfuric acid and adding alkali to obtain a 4-amino-1-naphthol having a methyl group in the 2 or 3 position. No. 452,542. Wilbur F. Kamm and Benjamin F. Tullar (to Parke, Davis & Co.).

**Making a methyl-4-amino-1-naphthol** which comprises converting 1-amino-naphthalene having a methyl group in the 2 or 3 position by diazotization and hydrolysis into the corresponding 2- or 3-methyl-1-naphthol, coupling the latter with a diazotized aryl amine and catalytically reducing the coupled product at the diazo linkage to introduce an amino group in the 4-position. No. 452,543. Wilbur F. Kamm and Benjamin F. Tullar (to Parke, Davis & Co.).

**In a process for preparing an alkaline earth metal phenoxide of an alkyl phenol sulfide** which comprises refluxing a mixture of an alkyl phenol sulfide and a member of the class consisting of the alkaline earth metal oxides and hydroxides, in the presence of a hydrocarbon solvent and separating and withdrawing water from the refluxing solvent, said refluxing being continued until water is no longer present. No. 452,567. Carl Winning and Louis A. Mikeska (to Standard Oil Development Co.).

## *Packaging

**Liquid-hydrocarbon-resistant container** comprising sheets of ethylene-dichloride-polysulphide plastic coated on at least one side with successive layers of mixed ethylene dichloride polysulphide plastic and polymerized chlorobutadiene of diminishing ethylene dichloride polysulphide plastic content and a final overlapping coat of polymerized chlorobutadiene. No. 2,451,911. Vally N. Braden (to Wingfoot Corp.).

## *Paper and Pulp

**Coating composition for paper** comprising polyvinyl alcohol, ethyl alcohol, water, titanium dioxide, and sorbitol lactate. No. 2,449,812. Laurence R. B. Hervey and Alvin C. Whitaker (to the U. S. A. by the Secretary of War).

**Bleaching an aqueous suspension of groundwood pulp** comprising: adding zinc hydrosulphite. No. 2,450,034. Howard J. Cronin (to International Paper Co.).

**A chemically prepared wood pulp product** having incorporated therein a mixed ether having the following formula: $R{-}O\left(\begin{matrix}CHCH_2O\\ |\\ R_1\end{matrix}\right)_x H$

where R is an aryl radical substituted by at least one radical selected from the class consisting of an alkyl radical with more than 2 carbon atoms, an acyl radical with more than 2 carbon atoms and a cycloalkyl radical; where $R_1$ is selected from the group consisting of hydrogen and methyl and where $x$ is a whole number greater than 1. No. 2,451,558. Paul Henry Schlosser and Kenneth Russell Gray (to Rayonier, Inc.).

**Treating a fabricated, flexible, paper-like sheet material** consisting of a major portion of asbestos fiber and a minor portion of bentonite to increase the tensile strength thereof, which comprises impregnating said sheet material with a solution of a compound of a metal selected from the group consisting of magnesium, barium, calcium, zinc, and aluminum, thereafter impregnating said sheet material with a solution of ammonia. No. 2,451,805. Thomas D. Callinan (to General Electric Co.).

### *Canadian*

**Glassine paper** plasticized with a plasticizer an essential ingredient of which is an addition compound of urea with a water-soluble nitrate. No. 451,897. Herbert B. Wenberg (to Nicolet Paper Corp.).

## *Petroleum

**Treating a hydrocarbon feed stock comprising the steps of subjecting the** feed stock in a vapor phase in contact with a ferrous alloy reaction vessel to a high temperature to cause non-catalytic reaction thereof and maintaining a carboxylic acid in the feed stock while it is in the reaction zone to suppress corrosion of said vessel. No. 2,449,585. Elza Q. Camp (to Standard Oil Development Co.).

**Distillation of oil shale under fluidized conditions.** No. 2,449,615. Edward B. Peck (to Standard Oil Development Co.).

**Catalytic cracking process.** No. 2,449,617. Nick P. Peet (to Standard Oil Development Co.).

**Multiple stage regeneration of spent catalysts.** No. 2,449,622. Bruno E. Roetheli (to Standard Oil Development Co.).

**A composition of matter** consisting of an oleaginous vehicle with a tendency to foam during processing and a foam inhibiting additive consisting essentially of a liquid non-volatile polymer of a chlorofluoro substituted olefin of 2 to 10 carbon atoms, said polymer containing 10 to 50 carbon atoms per molecule and having a major part of its normal hydrogen content replaced with said halogens. No. 2,449,631. John C. Zimmer and Raphael Rosen (to Standard Oil Development Co.).

**Mineral oil composition** comprising a viscous mineral oil fraction having in admixture therewith a minor proportion, sufficient to inhibit said oil fraction against the deleterious effects of oxidation, of an oil-soluble, acidic, phosphorus- and sulfur-containing reaction product obtained by: reacting an alkyl halide and a phosphorus sulfide in the presence of a Friedel-Crafts catalyst at an elevated temperature and separating said acidic reaction product so formed from the reaction mixture obtained in the reaction. No. 2,449,934. John J. Giammaria (to Socony-Vacuum Oil Co., Inc.).

**Hydrofluoric acid alkylation process.** No. 2,450,038. Frederick E. Frey (to Phillips Petroleum Co.).

**In the destructive hydrogenation of hydrocarbon oils** in the presence of a hydrogenation catalyst comprising an acid-treated bentonitic clay carrier and a hydrogenation catalyst impregnated therein, the improvement which comprises contacting the hydrocarbon oil to be destructively hydrogenated at elevated temperatures and pressures with the said catalyst, which catalyst has been prepared by first subjecting the acid-treated bentonitic clay base to a heat treatment at a temperature within the range of from about 850° to 1,000° F. for a period of about 4 to 8 hours prior to impregnation with the active hydrogenation catalyst. No. 2,450,316. Alexis Voorhies, Jr., and William E. Spicer (to Standard Oil Development Co.).

**Forming an active hydrogenation catalyst** which consists essentially in subjecting a bentonitic clay to treatment with hydrofluoric acid, thereafter activating the clay by heating, cooling and incorporating metallic nickel into the activated carrier by impregnation. No. 2,450,317. Alexis Voorhies, Jr., and William E. Spicer (to Standard Oil Development Co.).

**A mineral oil fraction** having in admixture a stable, oil-soluble, phosphorus- and sulfur-containing reaction product obtained by reaction of phosphorus pentasulfide and a thermal cycle stock. No. 2,450,405. Henry G. Berger, Thomas T. Noland and Everett W. Fuller (to Socony-Vacuum Oil Co., Inc.).

**Petroleum lubricating oil** comprising petroleum oil of lubricating viscosity, an oil-soluble alkaline earth metal high molecular weight aliphatic type alkaryl sulfonate and an oil-soluble zinc dithiocarbamate. No. 2,450,633. James O. Clayton (to California Research Corp.).

**Combination desulfurization-cracking process.** No. 2,450,724. Henry W. Grote (to Universal Oil Products Co.).

**Apparatus and process for hydrocarbon conversion.** No. 2,450,753. Jesse A. Guyer (to Phillips Petroleum Co.).

**Producing blown asphalts** which comprises air-blowing a high molecular weight petroleum hydrocarbon in the presence of a phosphorus catalyst selected from a group consisting of phosphorus pentoxide, stable phosphorus sulfides and red phosphorus. No. 2,450,756. Arnold John Hoiberg (to Lion Oil Co.).

**Refining mineral lubricating oils** by contacting a mineral oil comprising lubricating oil fractions and organic acids with an alkaline reagent to form a substantially neutralized mineral oil and continuously distilling. No. 2,451,025. Harold L. Ellender (to Standard Oil Development Co.).

**Producing high quality aviation gasoline** which comprises cracking a gas oil in the presence of a synthetic alumina-silica gel catalyst. No. 2,451,041. Eger V. Murphree (to Standard Oil Development Co.).

**Separating a desired gaseous hydrocarbon** fraction from a hydrocarbon mixture also containing lighter and heavier components which comprises commingling said hydrocarbon mixture with a liquid absorbent under pressure. No. 2,451,136. Herman H. Wenzke (to Universal Oil Products Co.).

**Hydrocarbon material containing a stabilizing amount of a** product obtained by reacting a sulfide of phosphorus with a divalent group II metal salt of a compound having the characterizing structure: R—Ar(XH)—$Y_x$—R′ in which the groups R, XH and $Y_x$—R′ are all connected to the aromatic nucleus Ar, and in which R represents at least one alkyl group of 4 to 24 carbon atoms and R′ represents an aryl group, X is an element of the group consisting of oxygen and sulfur, Y is a member of the sulfur family of elements, and $x$ is an integer from 1 to 4. No. 2,451,345. John G. McNab and Dilworth T. Rogers (to Standard Oil Development Co.).

**Petroleum hydrocarbon material** containing a stabilizing amount of a product obtained by reacting a sulfide of phosphorus with a basic polyvalent metal salt of an acidic organic compound. No. 2,451,346. John G. McNab and Dilworth T. Rogers (to Standard Oil Development Co.).

**Cracking hydrocarbons by subjecting said hydrocarbons to suitable** cracking conditions of time, temperature and pressure in the presence of an ester of an oxygen-containing phosphorus acid and a substance selected from the group consisting of halogens, hydrogen halides, carbon tetrahalides and organic halogen compounds. No. 2,451,375. Richmond T. Bell (to The Pure Oil Co.).

**Concentrating olefinic gases** in a hydrocarbon gas mixture by contacting the mixture with a composition comprising an aqueous solution containing in solution an acid, a cuprous salt, and a salt of a tertiary amine. No. 2,451,376. George G. Bernard and Donald C. Bond (to The Pure Oil Co.).

**Hydrocarbon extraction apparatus.** No. 2,451,433. Hyman R. Davis (to The Lummus Co.).

**Dewaxing an oil-wax mixture** which comprises commingling the oil-wax mixture with a solvent and a cerophile, said solvent comprising a mixture of toluene, nitrobenzene, and o-nitrotoluene, and said cerophile comprising a liquid paraffinic hydrocarbon. No. 2,451,545. Seymour W. Ferris (to The Atlantic Refining Co.).

**Treating petroleum hydrocarbons** which comprises contacting with a catalyst comprising a water-insoluble magnesium silicate activated by treatment with an ammonium compound in aqueous solution. No. 2,451,564. William A. La Lande, Jr. (to Attapulgus Clay Co.).

**Treating a hydrocarbon material** containing as an impurity organically combined fluorine to remove fluorine which comprises contacting with a liquid mixture of hydrogen fluoride and the organic constituents of a sludge resulting from the treatment of hydrocarbons with a sludge-forming hydrocarbon conversion catalyst. No. 2,451,568. Carl B. Linn (to Universal Oil Products Co.).

**Regenerating finely divided solid material** containing combustible deposits which comprises passing an oxidizing gas upwardly through a regeneration zone containing said finely divided solid material, maintaining the temperature sufficient to burn combustible deposits, and injecting steam in the stream of regeneration gas. No. 2,451,573. William A. Myers and William A. Hall (to The Atlantic Refining Co.).

**In a catalytic conversion process wherein fluidized solids are contacted** with hydrocarbon vapors, the accumulation of carbonaceous deposits on said solids are regenerated in a regeneration zone to effect combustion

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* *U. S. Patents from Vol. 614, Nos. 2, 3, 4. Vol. 615, Nos. 1, 2, 3. Canadian from Oct. 12-Nov. 9.*

of said carbonaceous deposits. No. 2,451,619. Robert J. Hengstebeck and Robert S. McDaniel (to Standard Oil Co.).

**A stable normally liquid viscous mineral oil composition** comprising a viscous mineral oil normally susceptible to oxidative deterioration in the presence of metal and N,N'-dibenzyl-paraphenylene diamine. No. 2,451,642. Roger W. Watson (to Standard Oil Co.).

**A composition of matter comprising a major amount of a liquid hydrocarbon** containing finely dispersed therein a minor amount, sufficient to inhibit corrosion of an organic sulfone. No. 2,451,874. Willis G. Routson (to Shell Development Co.).

**Operating a hydrocarbon synthesis plant** continuously, which comprises providing at least two reaction zones containing fluidized masses of powdered catalyst, charging a gaseous mixture containing CO and hydrogen. No. 2,451,879. Walter G. Scharmann (to Stand Oil Development Co.).

**Distillation of butane** containing high boiling contaminants. No. 2,451,896. Glenn W. Wilson, Jr. (to Standard Oil Development Co.).

**Method of mixing alkylation reactants.** No. 2,452,017. Julius B. Middleton (to Socony-Vacuum Oil Co., Inc.).

**Alkylation process.** No. 2,452,018. Julius Blake Middleton (to Socony-Vacuum Oil Co., Inc.).

*Canadian*

**Dehydrogenating paraffinic hydrocarbon gases** by contacting with a catalyst comprising "activated alumina" made by precipitating the trihydrate of alumina from an aluminate solution and calcining the precipitate and a vanadium-oxygen compound. No. 452,555. Carlisle M. Thacker (to Pure Oil Co.).

## *Photographic

**Colloid silver bromide emulsion** containing N-alkylaminomonohydroxybenze having from 1 to 2 carbon atoms in the alkyl radical. No. 2,449,836. R. K. Blake (to E. I. du Pont de Nemours & Co.).

**A photographic developing solution** comprising as the developing agent 3-methylsulfonamido-4-amino-dimethyl aniline. No. 2,449,919. Arnold Weissberger (to Eastman Kodak Co.).

**Treating a protein having inherent photographically active ingredients** to render those photographically active ingredients inactive which comprises treating the protein while in solution with a finely divided metal selected from the group consisting of platinum, nickel, cobalt, lead, cadmium, and silver, followed by removing the metal particles and any reaction products thereof from the protein. No. 2,449,980. Rudolph E. Damschroder and Marie E. Kauffman (to Eastman Kodak Co.).

**Photographic emulsions** containing trinuclear iminol cyanine dyes. No. 2,450,390. Alfred W. Anish (to General Aniline & Film Corp.).

**Light sensitive silver halide emulsion layer** diffusely containing a nitraniline selected from the group consisting of at least one of the sulphonic acids of o-nitraniline, and p-nitraniline and their water-soluble salts, which does not sensitize the emulsion and for all practical purposes has no deleterious action on the emulsion. No. 2,450,747. Burt H. Carroll (to Eastman Kodak Co.).

**Photographic silver halide emulsion** selected from the group consisting of silver chlorobromide, silver bromide and silver bromidide emulsions spectrally sensitized with a sensitizing cyanine dye, containing as a supersensitizer, a quinoline base containing an acyloxy group attached to a carbon atom of the quinoline base. No. 2,450,748. Burt H. Carroll and John Spence (to Eastman Kodak Co.).

**Producing colored image records simulating** black on a light background on a traveling carrier which comprises treating the carrier with an alkaline solution containing benzidine-3,3'-disulfonic acid, an alkali metal nitrite to effect tetrazotization of the benzidine-3,3'-disulfonic acid, a neutral electrolyte to facilitate the passage of the electrolyzing current, and as coupling components a diacetoacetyl alkylene polyamine and $XC_6H_4CO\text{-}NHC_nH_x(OH)(SO_3H)_2$ in which X is selected from the class consisting of hydrogen, acylamino, alkoxy, alkyl, halogen and aryloxy, and subjecting the treated carrier to the action of an electrolytic recording current. No. 2,451,331. Harold Grey Greig (to Radio Corp. of America).

*Canadian*

**Colloid silver halide emulsion containing silver halide of** a condensation product of an aliphatic aldehyde with a base taken from the group consisting of ammonia and primary amines. No. 451,845. Postell Mood Nicholes and James Harold Taylor (to Canadian Industries, Ltd.).

**Treating a photographic element** bearing at least one water-permeable layer containing a color developed dye image taken from the group consisting of quinoneimine or azomethine dye images and silver and silver salts with an aqueous solution containing a compound taken from the group consisting of unsubstituted benzaldehyde and naphthaldehyde monocarboxylic and monosulphonic acids and their alkali metal and ammonium salts. No. 451,861. Andrew Bradshaw Jennings (to E. I. du Pont de Nemours & Co.).

**Photographic element** comprising a support bearing at least one light-sensitive silver halide emulsion layer carried thereby which has in contact with the silver halide grains a polyalkylene glycol having a molecular weight of at last 400, the alkylene groups of which contain 2 to 4 carbon atoms, and constitute the only hydrocarbon groups in said glycols and a member taken from the group consisting of saturated, aliphatic, polyhydric alcohols of 2 to 6 carbon atoms and their alkyl ethers fatty acid esters containing not more than 3 carbon atoms in the ether or ester radical. No. 451,865. Ralph Kingsley Blake (to E. I. du Pont de Nemours & Co.).

**Photographic silver halide emulsion** containing a color-forming component capable fo reacting with the oxidation products of a primary aromatic amino developer to produce an azine dye, said component being a poly-nuclear aromatic amine having an arylamino group in 1-position and in the 3-position an acylated amino group the nitrogen atom of which is directly linked to the ring, said polynuclear aromatic ring being capable of coupling in the 4-position. No. 452,162. Willy A. Schmidt and Joseph A. Sprung (to General Aniline & Film Corp.).

## *Polymers

**A heat-hardenable hydrocarbon-polysiloxane resin** containing an average of more than one and less than two hydrocarbon groups per silicon atom, and, as a curing catalyst for the said resin, a small amount of a metal salt of an organic acid soluble in said resin. No. 2,449,572. Charles E. Welsh (to General Electric Co.).

**Improving vegetable oil modified alkyd resins** containing a plurality of groups containing active hydrogen by reacting with silicon tetraisocyanate. No. 2,449,613. Henry Charles Miller and Burt Carlton Pratt (to E. I. du Pont de Nemours & Co.).

**Aqueous polymer dispersions** for use in the production of articles by dipping which comprise, in aqueous dispersion, polyvinyl chloride, polystyrene and a plasticizer compatible with said polymer mixture. No. 2,449,684. Reginald George Robert Bacon, Harold Taylor and Leonard Wood (to Imperial Chemical Industries, Ltd.).

**Plastic material** comprising organic solvent-soluble allyl starch compounded and cured with sulfur. No. 2,449,816. Peter L. Nichols, Jr., and Robert M. Hamilton (to the U. S. A. by the Secretary of Agriculture).

**Preparing a resinous material** by heating a mixture of polylactylic acids, fatty, drying oils, and oil-soluble petropols, said heating being effected under conditions permitting the removal of volatile products of reaction until a viscous, elastic, resinous product is formed. No. 2,449,828. Paul D. Watson (to the U. S. A. by the Secretary of Agriculture).

**Preparing a high impact thermosetting plastic** which comprise reacting phenol, aniline and formaldehyde in the presence of calcium hydroxide. No. 2,449,876. Francis E. Calvert and Paul A. Bury (to Drackett Co.).

**Clear, transparent hydrogenation product of a linear copolymer** of (1) a mixture of 85 per cent 2-methyl-1,3-pentadiene and 15 per cent 4-methyl-1,3-pentadiene with a compound selected from the group consisting of styrene, alpha-methyl styrene, dichlorostyrene, and 1,3-butadiene. No. 2,449,949. Rupert C. Morris and John L. Van Winkle (to Shell Development Co.).

**As a heat polymerizable N-vinyl pyrrole composition** which is stablized to polymerization in the molten state at temperatures slightly above its melting point but which may be readily polymerized by heating at temperatures above 100° C., a heat polymerizable monomer N-vinyl pyrrole compound having a melting point below 100° C., containing an effective amount, up to 5 per cent, of a compound selected from the group consisting of formamide, acetamide and acetoacetanilide to stabilized said N-vinyl pyrrole compound at temperatures slightly above its melting point. No. 2,449,951. William O. Ney (to General Aniline & Film Corp.).

**Composition of matter** comprising a vinylidene chloride resin and an organic di-ester of endo-methylene-tetrahydrophthalic acid. No. 2,449,959. Hanns Peter Staudinger, Donald Faulkner, and George Thomas Wright (to The Distillers Co., Ltd.).

**Stabilizing a solid terpene polymer** by contacting said polymer with iodine. No. 2,449,970. Joseph N. Borglin (to Hercules Powder Co.).

**Moldable self-hardening plastic composition** comprising rye flour mixed with one to three times its weight of powdered magnesite and with a sufficient amount of a concentrated magnesium chloride solution to form a dough-like mass. No. 2,450,258. Max Skolnik (to Fibro-Mold Specialties, Inc.).

**Plasticizable organic compounds** plasticized with an alkoxyalkyl ether of a halonitrophenol. No. 2,450,272. George L. Doelling and Kenneth H. Adams (to Mississippi Valley Research Laboratories, Inc.).

**Polymerizing in aqueous emulsion a conjugated butadiene hydrocarbon** in the presence of an alkali metal salt of hydroxytetrahydroabietic acid. No. 2,450,416. Joseph N. Borglin (to Hercules Powder Co.).

**Producing a molded product** comprising a reaction product of sulfur dioxide and 2-butene. No. 2,450,424. Frederick E. Frey (to Phillips Petroleum Co.).

**Resinous composition** comprising a polymer of vinyl chloride and a **plasticizer** mixture consisting of a dioctyl phthalate and liquid petrolatum. No. 2,450,435. Addeline J. McGillicuddy (to Bennett H. Levenson and Frank L. Towne or Blanche Towne).

**Producing polymers from ethylene** which comprises subjecting ethylene to the action of an organic peroxide polymerization catalyst at a pressure above about 15 atmospheres, a temperature of from about the decomposition temperature of the catalyst to about 150° C. higher than said decomposition temperature, and in the presence of a saturated hydrocarbon diluent containing at least 3 carbon atoms and a metal selected from the group consisting of magnesium, zinc, cadmium, and mercury. No. 2,450,451. Louis Schmerling (to Universal Oil Products Co.).

**In the continuous process for producing a dispersed solid polymer,** the particles of which tend to coalesce during removal from the reactor, the improvement comprising continuously screening said polymer immediately after reaction while it is still at low temperature, to separate it from the liquid. No. 2,450,547. Peter J. Gaylor.

**In a method of controlling the oil phase gelling and polymerization** of a polymerizable mix comprising a liquid polyhydric alcohol ester of an alpha-olefinic dicarboxylic acid, and a liquid monomeric unsaturated polymerizable compound in which the unsaturation is due to a single terminal ethylenic group which is attached to a negative radical, and in which the said ester is soluble and with which ester it is copolymerizable in the presence of a peroxy polymerization catalyst, that improvement which consists in the step of adding a small but effective amount of a promoter of gelation which is a polyamino compound selected from the class consisting of ethylene polyamines and propylene polyamines, each containing at least one terminal primary amino group, and the N-ylidene derivatives of the foregoing polyamines obtained from their reaction with aldehydes. No. 2,450,552. Everett C. Hurdis (to U. S. Rubber Co.).

**Preparing an aqueous dispersion of synthetic resin** selected from the group consisting of polyisobutylene, and copolymers of isobutylene with the copolymer of a conjugated diene selected from the group consisting of butadiene-1,3 and isoprene, which comprises mixing with such synthetic resin a heat-reaction product of a mix containing rosin, an alkanolamine an alkylene glycol and a dimerized acid of a vegetable drying oil, and also mixing with the synthetic resin a hydrophilic colloidal dispersing agent selected from the group consisting of soaps, proteins, solubilized casein and colloidal clay, and adding water until an inversion of phase takes place. No. 2,450,579. Charles F. Brown (to U. S. Rubber Co.).

**Copolymeric organo-siloxane** comprising organo-silicon units which correspond to the formulae $CH_3SiO_{3/2}$ and $RSiO_{3/2}$ respectively where R is an alkyl radical having from 12 to 18 carbon atoms, said units being joined together by the oxygen atoms of said units. No. 2,450,594. James Franklin Hyde (to Corning Glass Works).

**Product comprising an interpolymer** of a diallyl ester of a nuclearly chlorinated phthalic acid and an unsaturated alkyd resin, the allyl residues of the diallyl ester being unsubstituted and the two ingredients comprising the interpolymer being compatible and copolymerizable. No. 2,450,682. Birger W. Nordlander (to General Electric Co.).

**Vulcanizable composition** comprising a vulcanizable organic plastic substance containing unsaturated carbon to carbon bonds and a vulcanizing agent which is a stable plastic sulfur composition produced by subjecting a mixture comprising a compound selected from the group consisting of hydrocarbons and partially halogenated hydrocarbons, oxygen and a compound selected from the group consisting of hydrogen sulfide, and mercaptans to the action of an elevated temperature above 250° C. and below that temperature at which spontaneous combustion of the mixture occurs. No. 2,450,771. William E. Vaughan and Benjamin Barnett (to Shell Development Co.).

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* *U. S. Patents from Vol. 614, Nos. 2, 3, 4. Vol. 615, Nos. 1, 2, 3. Canadian from Oct. 12-Nov. 9.*

action temperature reactants consisting of the formaldehyde, an alcohol in which the sole reactive groups consist of alcoholic hydroxyl, and said last-mentioned polyamide in the absence of said acid catalyst, then adding to the reaction mixture an oxygen-containing acid. No. 451,839. William Hale Charch (to Canadian Industries Ltd.).

**Process which comprises the steps of forming a reaction mixture containing N-alkoxymethyl polyamide** by reacting in the presence of a catalyst reactants consisting of a synthetic linear polyamide which has hydrogen bearing intralinear carbonamide groups and in which the average number of carbon atoms separating the amide groups is at least 2, an aliphatic alcohol in which the alcoholic hydroxyl is the sole reactive group and formaldehyde which is present in substantial excess of that required to form the N-alkoxymethyl polyamide obtained and then reacting the resulting reaction mixture with a formaldehyde-reactive resin-forming material selected from the group consisting of urea, thiourea, melamine, a phenol having at least 3 nuclear hydrogen atoms, casein, zein, soyabean protein, and a sulphonamide. No. 451,840. Henry Shirley Rothrock (to Canadian Industries Ltd.).

**Interpolymer of ingredients comprising 2-nitro-2-methylpropyl methacrylate** and methyl methacrylate. No. 451,846. Courtland Le Verner Agre and Robert Mitchell Leekley (to Canadian Industries Ltd.).

**Composition of matter containing macerated cloth impregnated with a** thermo-setting potentially reactive phenolic resin, a thermosetting potentially reactive resin in liquid form, graphite and a powdered alloy consisting of 84 per cent lead, 4 per cent tin and 12 per cent antimony. No. 451,854. Edwin J. Coleman (to Crane Packing Co.).

**Providing a solid methyl methacrylate polymer with improved surface characteristics** by applying a coating solution comprising ethyl silicate hydrolyzed with water, and a polyvinyl butyral resin and a second coating solution comprising ethyl silicate hydrolyzed with water and a vinyl acetate polymer hydrolyzed and heating the coated surface at elevated temperature to cure the top coat thus formed and bond same to the surface of said base coat. No. 451,863. Max Frederick Bechtold (to E. I. du Pont de Nemours & Co.).

**Polymerizing in the form of an aqueous emulsion a mixture of butadiene** and a monomer copolymerizable therewith in aqueous emulsion in the presence of catalytic amounts of water-soluble salts of iron and cobalt and a water-soluble pyrophosphate. No. 451,872. William Dorsey Stewart and Benjamin Michael George Zwicker (to B. F. Goodrich Co.).

**Vulcanizing a copolymer of a butadiene-1,3 hydrocarbon and an alpha-**methylene nitrile which comprises heating a composition which contains said copolymer but is free of sulphur and other sulphur-containing vulcanizing agents. No. 451,873. **Benjamin S. Garvey (to The B. F. Goodrich Co.).**

**Production of a polymer** which consists of heating in liquid phase under anhydrous and non-oxidizing conditions of a mono-olefinic ester of a monocarboxylic acid and monohydric alcohol having an olefinic linkage between 2 carbon atoms one of which has at least one hydrogen atom linked directly thereto and the other of which is linked directly to a saturated carbon atom having the hydroxyl group linked directly thereto, which ester contains only double-bonded unsaturation and no other elements than carbon, hydrogen, oxygen and halogen, said polymerization being catalyzed by having said ester in the presence of a neutral cadmium salt from the group consisting of cadmium sulphate, carbonate, phosphate, sulphite, arsenite, arsenate, nitrate, borate, tellurate, chromate, selenate and chlorate. No. 451,916. David E. Adelson and Harold F. Gray, Jr., and Robert P. Ruh (to Shell Development Co.).

**Production of polyallyl acetate** which consists of boiling allyl acetate at atmospheric pressure under anhydrous and non-oxidizing conditions in the presence of mercuric chloride for a time sufficient to effect polymerization of the allyl acetate. No. 451,917. David E. Adelson and Harold F. Gray, Jr., and Robert P. Ruh (to Shell Development Co.).

**Production of polyallyl acetate** which consists of boiling allyl acetate at atmospheric pressure under anhydrous and non-oxidizing conditions in the presence of cadmium acetate for a time sufficient to effect appreciable polymerization of the allyl acetate. No. 451,918. David E. Adelson, Harold F. Gray, Jr., and Robert P. Ruh (to Shell Development Co.).

**Production of polyallyl acetate** which comprises boiling allyl acetate at atmospheric pressure under anhydrous and non-oxidizing conditions in the presence of bismuth trifluoride for a time sufficient to effect appreciable polymerization of the allyl acetate. No. 451,919. David E. Adelson, Harold F. Gray, Jr., and Robert P. Ruh (to Shell Development Co.).

**Making a liquid vinyl resin dispersion which can** be blended with rubber latex to form substantially stable emulsions capable of controlled and uniform coagulation, which comprises forming a mixture of monomeric methacrylic acid, monomeric acrylonitrile and refluxing in the presence of benzoyl peroxide. No. 451,984. Gerry P. Mack (to Advance Solvents & Chem. Corp.).

**Resinous emulsion characterized by good stability comprising an aqueous** medium comprising water and a water soluble organic solvent as the continuous phase, a partially reacted thermosetting phenol-aldehyde resin in the alcohol soluble stage as the dispersed phase, the resin being soluble in the water soluble organic solvent, and an emulsifying agent and protective colloid for the dispersed phenol-aldehyde resin comprising a glycinin protein peptized with ammonium hydroxide. No. 452,002. Philip K. Porter (to Canadian Westinghouse Co. Ltd.).

**Making a flexible, substantially longitudinally grooved emery fillet which** consists in wrapping a narrow textile fabric around a cylinder to cover the surface thereof, applying to the exposed face of said fabric a first solution in volatile solvent of an alkyd resin plasticized urea formaldehyde resin, dusting coarse emery particles on the coating formed, applying a second solution of an alkyd resin plasticized urea formaldehyde, dusting further coarse emery particles, revolving the cylinder carrying said fabric with the coated surface of said fabric in contact with a ribbed roller to produce complementary grooving. No. 452,225. Samuel Wilkinson Dronsfield.

**A coherent urea-formaldehyde moulding composition** composed of a substantially completely reacted urea-formaldehyde condensation product containing more than 8 per cent of physically admixed inert volatile liquid, said composition being capable of molding into shaped articles by injection. No. 452,253. Leonard Smidth.

**In the manufacture of a poly-component sulfonate product** by the sulfonation of an alkyl-aromatic condensation product which contains a mixture of alkyl-aromatic compounds and has been obtained by chlorinating a liquid petroleum distillate, said distillate being a cut composed of hydrocarbons containing at least 7 but not more than 19 carbon atoms per molecule, and condensing the chlorinated distillate with an aromatic compound of the group consisting of mononuclear and dinuclear aromatic hydrocarbons and their mono- and di-halogen, -hydroxy, -alkoxy, and -phenoxy substitution products, the improvement which comprises subjecting said condensation product to a sulfuric extraction under such conditions that between 5 and 25 per cent of the condensation product is sulfonated, separating the sulfuric extract and sulfonating the separated condensation product. No. 452,268. Lawrence H. Flett (to Allied Chemical & Dye Corp.).

**Terpolymers of methyl methacrylate, styrene, and 3,5-heptadienone-2.** No. 452,318. Pliny Otto Tawney (to Dominion Rubber Co., Ltd.).

**Aqueous emulsion polymerizate of a mixture of butadiene-1,3 and styrene** containing a soap of abietic acid and a soap of an aliphatic acid having a chain of 8-24 carbon atoms in the molecule. No. 452,319. John Storrow Rumbold (to Dominion Rubber Co., Ltd.).

**Treating an aqueous emulsion polymerizate of a mixture of butadiene-1,3** and styrene which comprises allowing an emulsion polymerizate containing a vegetable mucilage and alkali-metal hydroxide to stand until it separates into a polymer-rich fraction and a polymer-poor fraction and separating. No. 452,320. John Storrow Rumbold (to Dominion Rubber Co., Ltd.).

**Treating an aqueous emulsion polymerizate** of a mixture of butadiene-1,3 and styrene which comprises adding an ammonium salt and formaldehyde to reduce the pH without irreversibly coagulating the same, adding dimethylamine to raise the pH, and adding a vegetable mucilage and allowing the emulsion polymerizate to stand until it separates into a polymer-rich fraction and a polymer-poor fraction, and separating. No. 452,321. Edward Charles Svendsen (to Dominion Rubber Co., Ltd.).

**Improvement in the creaming with hydrophilic colloidal creaming agents** of aqueous emulsion polymerizates of polymerizable material selected from the group consisting of butadienes-1,3 and mixtures of butadienes-1,3 with other polymerizable compounds capable of forming copolymers with butadienes-1,3 which comprises creaming with a hydrophilic colloidal creaming agent a mixture of a plurality of such emulsion polymerizates having different average particle sizes. No. 452,322. John Storrow Rumbold (to Dominion Rubber Co., Ltd.).

**A stable synthetic resin latex** capable of being dried to form transparent coherent films and coatings containing spherical particles of a resinous copolymer of a chloroethylene containing from 1-2 chlorine atoms on one only of the carbon atoms with 1 part of methyl acrylate in an aqueous medium containing an emulsifying agent selected from the class consisting of N-octadecyl sulfosuccinamide sodium salt and N-octadecyl N-1, 2-dicarboxyethyl sulfosuccinamide sodium salt. No. 452,330. Grant W. Smith (to B. F. Goodrich Co.).

**Copolymer comprising a 2-chloroallyl ester of a saturated fatty acid,** the acid containing not more than 6 carbon atoms, interpolymerized with butadiene-1,3. No. 452,416. Albert M. Clifford (to Wingfoot Corp.).

**Preparing polymerized materials by hydrolyzing part of a material se**lected from the group consisting of acrylonitrile, alpha alkyl acrylonitriles and alpha halo acrylonitriles to an acrylate by heating in the presence of an aqueous acidic hydrolyzing medium and a monohydric saturated primary aliphatic alcohol having not more than 5 carbon atoms, continuing heating the reaction mixture until the acrylate and unhydrolized material have copolymerized and separating the polymerized material. No. 452,417. J. D. D'Ianni (to Wingfoot Corp.).

**Emulsion copolymer** of butadiene-1,3 and a dialkyl monochloro-maleate. No. 452,418. **Albert Mitchell Clifford (to Wingfoot Corp.).**

**Recovering unreacted monomers** from a latex of rubber-like particles produced by emulsion copolymerization of butadiene and a liquid monomer from the class consisting of styrene and acrylonitrile. No. 452,419. Jay Burdette Mitchelson (to Wingfoot Corp.).

**Preparing a latex of a polymer of a hydrocarbon diolefine and a poly**merizable mono-olefinic monomer by mixing with water and a soap, heating to initiate polymerization, adding a soap at a plurality of subsequent time intervals during the continued polymerization. No. 452,422. John D. Wilkerson (to Wingfoot Corp.).

**Thermoplastic adhesive** consisting of polymerized vinyl acetate and pentaerythrityl-abietate resin. No. 452,475. John E. Robinson (to American Can Co.).

**Thermoplastic adhesive sealing composition** comprising polymerized vinyl acetate and pine wood pitch. No. 452,476. John E. Robinson (to American Can Co.).

**Polymerizing monomeric compounds containing a styrene nucleus having** a single olefinic hydrocarbon side chain which comprises heating the monomer in the presence of a two component catalyst composition which comprises as one component an oxy-compound of boron wherein each boron atom has at least one of its valences satisfied by linkage with an oxygen atom, and as the second component a compound of the formula R'-OOC-COO-R wherein R' and R represent each a member selected from the group consisting of hydrogen and univalent hydrocarbon radicals. No. 452,511. Victor H. Turkington and Leo R. Whiting (to Carbide & Carbon Chemicals, Ltd.).

**Producing a hydrophilic surface on an object made from a hydrophobic** polymer containing aromatic nuclei which comprises treating said surface with a member of the group consisting of concentrated sulfuric acid, fuming sulfuric acid, sulfur trioxide and chlorsulfonic acid. No. 452,514. Hanns Peter Staudinger and Henry Malcolm Hutchinson (to Distillers Co., Ltd.).

**Solid thermoplastic** which is a terpolymer of a monomeric ester of the class consisting of the alkyl, cycloalkyl, aryl, and aralkyl esters of acrylic acid, and of methacrylic acid, monomeric styrene, and a monomeric diallyl phthalate selected from the class consisting of diallyl phthalate and dimethallyl phthalate. No. 452,517. Pliny Otto Tawney (to Dominion Rubber Co., Ltd.).

**Preparing a dry-oil-modified-resin-containing powder for shipment** and subsequent admixture with water and a protein-pigment powder to give an improved water-paint which comprises admixing an oil-modified resin, an aminoalcohol and a lower aliphatic alcohol. No. 452,577. John G. Penniman and Richard E. Marshall (to Wesco Waterpaints (Canada).

## *Processes and Methods

**Contacting fluid reactants** with a solid catalyst slurry. No. 2,450,174. William W. Weinrich, Clark A. Holloway, Jr., and William S. Bonnell (to Gulf Research & Development Co.).

**Distillation treatment of complex mixtures of mutually soluble liquids** inseparable or separable only with difficulty by simple distillation, comprising continuously distilling a mixed hydrocarbon fraction containing aromatic hydrocarbons and paraffinoids in a distillation column with an aqueous solution containing acetone and methyl alcohol so that the acetone from the mixture is continuously removed in the top product with the paraffinoid components while the remaining components are removed in the effluent from the base of the column. No. 2,450,381. Sydney Jamieson Ralph and George Anthony Dummett (to The Aluminium Plant & Vessel Co., Ltd.).

**Method of contacting solids and gases.** No. 2,451,803. Donald L. Campbell, Homer Z. Martin and Charles W. Tyson (to Standard Oil Development Co.).

**Method of and apparatus for contacting solids and gases.** No. 2,451,804. Donald L. Campbell, Homer Z. Martin, Eger V. Murphree and Charles W. Tyson (to Standard Oil Development Co.).

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** U. S. Patents from Vol. 614, Nos. 2, 3, 4. Vol. 615, Nos. 1, 2, 3. Canadian from Oct. 12-Nov. 9.*

**Preparing a hard, fusible, polyamide resin soluble in butyl alcohol and insoluble in ethers, esters, and ketones,** comprising heating a polymeric substance of the group consisting of polymerized polyene fatty acids, and the esters and anhydrides thereof with an equivalent amount of ethylene diamine. No. 2,450,940. John C. Cowan, Lee Bert Falkenburg, Howard M. Teeter and Philip S. Skell (to U. S. A. by the Secretary of Agriculture).

**Preparing a purified low temperature olefinic polymer** comprising cooling a liquid solution of olefin hydrocarbon by addition of a Friedel-Crafts catalyst. No. 2,451,047. Arthur C. Skooglund and Charles C. Swoope (to Standard Oil Development Co.).

**Translucent sheet** for making templates, and comprising a mixture of polyvinylidene chloride with the remainder glass fibers. No. 2,451,126. Raymond B. Stringfield and Thomas R. Miles (to Consolidated Vultee Aircraft Corp.).

**Manufacturing new resinous condensation products** by heating in the presence of an acidic condensing agent (1) a soluble melamine-formaldehyde condensation product etherified with a monohydric alcohol and (2) a soluble phenol-formaldehyde condensation product etherified with a monohydric alcohol, the phenol and formaldehyde having been condensed in an alkaline condensing medium, the phenol being monohydric and having a hydrocarbon radical of 1-6 carbon atoms in one only of the o,o and p positions to the phenolic group, the remaining 2 of the said o,o and p groups being unsubstituted. No. 2,451,153. William Charlton and Jack Blatchely Harrison (to Imperial Chemical Industries, Ltd.).

**Curing a plastic polymer** of a saturated aliphatic monohydric alcohol ester of acrylic acid, which comprises heating with an oxide of lead. No. 2,451,177. Stephen T. Semegen (to The B. F. Goodrich Co.).

**Curing a solid plastic polymer** of an alkyl ester of acrylic acid, which comprises heating with a solid alkali metal hydroxide. No. 2,451,178. Stephen T. Semegen (to The B. F. Goodrich Co.).

**Forming a composite article** by introducing into a sheet of vulcanized rubber butyl phthalyl butyl glycollate, chlorinating the surface of the rubber sheet, applying to the surface a solution in methyl ethyl ketone of gamma polyvinyl chloride plasticized with butyl phthalyl butyl glycollate, and evaporating the solvent. No. 2,451,182. George H. Taft (to The B. F. Goodrich Co.).

**Glue composition** containing a thermosetting synthetic resin of the group consisting of urea-formaldehyde resin and melamine-formaldehyde resin and as an extender a meal from vetch seeds, which meal has such a high degree of fineness that at least 65 per cent of it passes through a sieve having a mesh of at the most 0.17 mm. (clear opening). No. 2,451,186. Gustave Widmer and Wilhelm Hertner (to Ciba, Ltd.).

**Thermoplastic coating composition** of Norelac, a plasticizer consisting of a mixture of ortho and para toluene ethyl sulfonamides, and paraffin, all dispersed in a volatile solvent. No. 2,451,212. Leon J. Gold (to Milprint, Inc.).

**In stripping latices of emulsion polymerizates** comprising an unpolymerized, normally liquid, unsaturated compound, the improvement comprising continuously passing a stream of said latex through several stripping zones in series, vaporizing the unpolymerized unsaturated compound by applying vacuum and passing a stripping gas through the latex. No. 2,451,332. Arthur Donald Green (to Standard Oil Development Co.).

**Preparation of N-substituted polymeric amic acids** which comprises reacting a styrene/maleic anhydride interpolymer in a solvent with a long chain secondary alkyl amine having a total of at least 18 carbon atoms in the combined alkyl groups, then adding at least one of the substances selected from the class consisting of ammonia and lower primary amines containing less than 7 carbon atoms. No. 2,451,370. Witty Lysle Alderson, Jr. (to E. I. du Pont de Nemours & Co.).

**Laminating syrup** comprising silica aerogel and a thermosetting resin taken from the group consisting of phenol-aldehyde, melamine-aldehyde, urea-aldehyde, dicyandiamide-aldehyde resins, melamine-urea-aldehyde and melamine-dicyandiamide-aldehyde resins. No. 2,451,410. Edgar M. Queeny (to Monsanto Chemical Co.).

**Synthetic resin** consisting of a copolymer of a ketone wherein the carbon of the carbonyl radical is directly joined to a radical from one group consisting of vinyl and isopropenyl radicals and to a radical from the group consisting of alkyl and phenyl radicals, said alkyl radical containing from 1 to 4 carbon atoms; with a nitrile from the group consisting of acrylonitrile and methacrylonitriles, further characterized by being clear, homogeneous, thermoplastic, readily flexible to hard substantially inflexible, and soluble in 2-nitropropane. No. 2,451,435. William E. Elwell and Richard L. Meier (to California Research Corp.).

**Interpolymer of diallyl diglycolate and styrene.** No. 2,451,536. Martin E. Cupery and Henry S. Rothrock (to E. I. du Pont de Nemours & Co.).

**Rendering N-alkenoxymethyl polyamides insoluble in alcohol and insoluble** N-alkenoxymethyl polycarbonamide, a free radical producing agent of said N-alkenoxymethyl polycarbonamide, said agent being selected from the group consisting of peroxy compounds, ketones organometallic compounds, and azo compounds. No. 2,451,672. Hugh W. Gray (to E. I. du Pont de Nemours & Co.).

**Polyamide** consisting of the reaction product of a polyamide-forming composition comprising a mixture of a dicarboxylic acid which has at least 4 chain carbon atoms between the carboxyl groups and in which the carboxyl groups are the sole reactive groups and a diamine of the formula $H_2N—Ar—CH_2.CH_2—Ar—NH_2$ in which Ar is a 1,4-arylene radical. No. 2,451,695. Richard S. Schreiber (to E. I. du Pont de Nemours & Co.).

**Process for embrittling polythene,** which comprises admixing about 100 parts by weight of the said polythene with about 10 parts by weight of methylated spirits, thereafter mechanically disintegrating. No. 2,451,743. Kenneth Barry Jarrett (to Imperial Chemical Industries).

**Composition used as an adhesive** and containing zinc oxide, a resinous material, a rubbery component, and a factice, the resinous component comprising a material from the group consisting of hydrogenated rosin, glyceryl ester of hydrogenated rosin, dehydroabietic acid and wood rosin, the rubbery component being material of the group consisting of polyisobutylene of molecular weight between 80,000 and 120,000 and a rubbery copolymer of isobutylene and a diolefine, the factice consisting of a highly refined cured vegetable oil of the group consisting of rapeseed oil and linseed oil. No. 2,451,865. William J. O'Brien (to The Seamless Rubber Co.).

**Composition comprising a partially polymerized melamine-formaldehyde resin** insoluble in water in concentrations below 35% but soluble within the range of concentrations from 35% to 70%, dispersed in a liquid medium comprising essentially a non-basic water-soluble alcohol from the group consisting of dehydric and trihydric alcohols as the disperse medium and hydroxy acetic acid, said composition being capable of being diluted with water without precipitation of resin. No. 2,451,867. Gilbert Pitzl (to E. I. du Pont de Nemours & Co.).

**Subjecting a solution of a hydrolyzed interpolymer of ethylene and vinyl acetate** in dioxane to a temperature between 30 and 200° C. with an alkyl isocyanate. No. 2,451,963. Donald John Loder (to E. I. du Pont de Nemours & Co.).

*Canadian*

**Compounds of the group consisting of poly (hexamethylene guanidine).** No. 451,795. Elmer Keiser Bolton and Donald Drake Coffman and Lucius Gilman (to Canadian Industries Ltd.).

**A polymer of a diester of carbonic acid** in which ester each acid group of the carbonic acid is esterified with a monohydric unsaturated alcohol containing at least 3 carbon atoms and having an aliphatically unsautrated carbon-to-carbon linkage in the alpha, beta position with respect to the carbinol carbon atom therein. No. 451,796. Henry John Richter and Henry Shirley Rothrock (to Canadian Industries).

**Reaction product of a plurality of different and separately formed, active-hydrogen-containing polymeric materials,** with an organic compound having as the sole reacting groups a plurality of —X=C=Y groups, wherein X is selected from the class consisting of —C and N, and Y is selected from the class consisting of O, S and NR, where R is selected from the class consisting of hydrogen and monovalent hydrocarbon radicals. No. 451,803. Burt Carlton Pratt and Henry Shirley Rothrock (to Canadian Industries Ltd.).

**Making fusible polymers** by heating a preformed dihydrazide of a dicarboxylic acid, in which the carboxyl groups are attached to aliphatic carbon atoms, at a temperature sufficient to cause evolution of water, continuing the heating until a polymer having an intrinsic viscosity of at least 0.1 is obtained, and discontinuing the polymerization before evolution in substantial amount of the basic nitrogenous materials. No. 451,807. William W. Prichard (to Canadian Industries Ltd.).

**Composition of matter** consisting of polyvinyl butyral containing combined butyraldehyde, resorcinol, an aqueous solution of formaldehyde, a solution of sodium hydroxide, and ethyl alcohol denatured with methyl alcohol. No. 451,814. Albert Hershberger (to Canadian Industries Ltd.).

**Process** which comprises polymerizing a mass, the polymerizable portion of which consists solely of vinyl acetate, in the presence of a peroxy catalyst and lauryl mercaptan. No. 451,818. Milton John Roedel (to Canadian Industries Ltd.).

**Solid organic polymer** having a surface film thereon obtained by coating a surface of the polymer with an acid polysilicic acid ester of an alcohol containing from 1 to 12 carbon atoms, inclusive. No. 451,820. Max Frederick Bechtold and Paul Swithin Pinkney (to Canadian Industries Ltd.).

**Process of preparing non-thermoplastic and insoluble films** which comprises milling at a temperature below 80° C. a polyvinyl acetal resin having a hydroxyl number from 121 to 165 with from 1 per cent to an equal amount thereof of a lower alkyl ether of dimethylol urea, calendering the mixture into a film and thereafter curing the film at a temperature between 80° C. and 125° C. to render it non-thermoplastic and insoluble. No. 451,821. Gordon Theodore Vaala (to Canadian Industries Ltd.).

**Disperse aqueous system** comprising in uniform distribution a vinyl-acetate polymer in fine state of subdivision with particle size averaging below 2 microns, a polymerization catalyst for vinyl acetate, a stabilizer comprising a petroleum hydrocarbon boiling above 125° C., a wetting agent being a sulphated aliphatic alcohol and a cationic surface-active agent. No. 451,823. Joseph Edward Smith and William Alexander Drummond (to Canadian Industries Ltd.).

**Photopolymerization of vinylidene compounds** in the presence of N-disubstituted dithiocarbonic esters. No. 451,824. Lawrence Marion Richards (to Canadian Industries Ltd.).

**Process for the polymerization** of a member of the group consisting of (1) acrylic acid nitrile and (2) a mixture of acrylic acid nitrile together with a minor proportion of another copolymerizable unsaturated compound, to obtain a dimethyl formamide-soluble polymer which consists in dissolving a member of the group consisting of (1) acrylic acid nitrile and (2) a mixture of acrylic acid nitrile together with a minor proportion of another copolymerizable, unsaturated compound with a water-soluble, oxygen-yielding peroxy catalyst compound in an amount of water sufficient only to provide a homogenous solution. No. 451,825. Ralph Albert Jacobson (to Canadian Industries Ltd.).

**Process for making polyvinyl fluoride** which comprises heating vinyl fluoride in contact with water and with a vinyl polymerization catalyst under a pressure in excess of 100 atmospheres at a reaction temperature with the range of 30° C. to 250° C. which activates the catalyst. No. 451,827. Donald Drake Coffman and Thomas Aven Ford (to Canadian Industries Ltd.).

**Synthetic polycarbonamide** having intralinear carbonamide groups which have extralinearly substituted for hydrogen of carbonamide nitrogen a substituent selected from the class consisting of $-CH_2SH$ and $-CH_2SSCH_2-$, the carbon atoms of said last mentioned substituent being attached to the nitrogen atoms of polycarbonamide groups, said polycarbonamide being macromolecular and having an average number of carbon atoms of at least two in the segments of the chain separating the amide groups. No. 451,828. Theodore Le Sueur Cairns (to Canadian Industries Ltd.).

**Laminated product** comprising at least two laminae bonded by a composition comprising a N-alkoxymethyl polyamide. No. 451,831. Fred Wayne Hoover (to Canadian Industries Ltd.).

**Semi-conducting coating composition** particularly adapted for the manufacture of high tension electric cables comprising a resinous vehicle containing a non-drying oil modified alkyd resin, a polyvinyl acetal resin, a ureaformaldehyde resin and a carbon black having electrical resistivity of less than about 1·0 ohm per 1" cube. No. 451,832. Donald Edwards Edgar and David Joseph Sullivan (to Canadian Industries Ltd.).

**Process for obtaining orientable polyvinylidene fluoride** which comprises heating vinylidene fluoride at a temperature of from 20° C. under a pressure above 300 atmospheres in the presence of a peroxy compound as a polymerization catalyst. No. 451,833. Thomas Aven Ford and William Edward Handford (to Canadian Industries Ltd.).

**Interpolymer of dimethyl 1-propene-2-phosphonate** with methyl methacrylate. No. 451,836. Richard Vernon Lindsey, Jr. (to Canadian Industries Ltd.).

**Process for obtaining a nitrogen-substituted polyamide** which comprises reacting in contact with a catalyst a polyamide having a unit length of at least 7 and having in the polymer chain hydrogen-bearing carbonamide groups with formaldehyde and a hydroxy carboxylic acid of the formula HORCOOH, wherein R is a saturated aliphatic divalent hydrocarbon radical containing from 1 to 17 carbon atoms, said catalyst consisting of an oxygen containing acid. No. 451,838. Theodore Le Sueur Cairns (to Canadian Industries Ltd.).

**In a process for obtaining N-alkoxymethyl polyamides** by reacting formaldehyde, alcohol, an acid catalyst and a synthetic linear polyamide and having hydrogen-bearing carbonamide groups as an integral part of the main polymer chain, the step which comprises heating to re-

*Canadian*

**Process and apparatus for producing carbon black.** No. 452,060. Joseph C. Krejci (to Phillips Petroleum Co.).

## *Rubber

**Preparing a synthetic rubber** by heating a mixture containing, as monomeric components, an alkyl acrylate and an ester of an alkenyl lactate and a polybasic carboxylic acid to effect copolymerization of the monomeric components, compounding the resulting copolymer with a rubber vulcanizing agent selected from the group consisting of sulfur and benzoyl peroxide, and heating the compounded mixture to effect vulcanization. No. 2,449,612. William C. Mast, Chessie E. Rehberg and Charles H. Fisher (to the U. S. A. by the Secretary of Agriculture).

**Synthetic rubber reclaimed** with a reclaiming oil composed of solvent naphtha and an aromatic hydrocarbon oil. No. 2,449,879. Frank W. Corkery (to Pennsylvania Industrial Chemical Corp.).

**Plasticizing a synthetic rubber** selected from the synthetic rubbers composed of the rubbery copolymers of butadiene and acrylic nitrile and the synthetic rubbers composed of the rubbery copolymers of butadiene and styrene by working the synthetic rubber with a liquid plasticizer composed essentially of an aromatic oil purified of contaminates and approximately free of polymers higher than dimers formed from compounds found in coke oven light oil. No. 2,449,928. Frank W. Corkery (to Pennsylvania Industrial Chemical Corp.).

**Plasticizing and tack-imparting blend** for elastomers, composed of a tack-imparting content of coumaroneindene resin and an aromatic oil formed from other compounds found in coke oven light oil. No. 2,449,929. Frank W. Corkery (to Pennsylvania Industrial Chemical Co.).

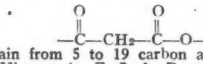
**Rubber-like material comprising the emulsion polymerization** product of para-methyl-alpha-methyl-styrene and butadiene 1,3. No. 2,450,028. Karl H. Weber and Paul O. Powers (to Armstrong Cork Co.).

**Preparing an aqueous dispersion of synthetic rubber** selected from the group consisting of polymers of butadienes-1,3 selected from the group consisting of butadiene-1,3, methyl-2-butadiene-1,3, chloro-2-butadiene-1,3, piperylene, and 2,3-dimethyl-butadiene-1,3, and copolymers, of such butadienes-1,3 with the copolymer of compounds which contain a single $CH_2{=}C<$ group and are copolymerizable therewith, which comprises mixing with such synthetic rubber a heat-reaction product of a mix containing rosin, an alkanolamine, an alkylene glycol and a dimerized acid of a vegetable drying oil, and also a hydrophilic colloidal dispersing agent selected from the group consisting of soaps, proteins, solubilized casein and colloidal clay, and adding water until an inversion of phase takes place. No. 2,450,578. C. F. Brown (to U. S. Rubber Co.).

**Rubber-like polymer** produced by polymerizing a hydroxyacetylated tall oil by condensation by means of heat in the presence of an esterification catalyst. No. 2,451,173. Richard Richter and John J. Miskel (to Nopco Chemical Co.).

**Vulcanizing a plasticized polymer composition having** as a base a polymer of a halogenated ethylene containing from 1 to 2 halogen atoms on one only of the carbon atoms, which comprises incorporating in said plasticized polymer composition, polymerized 2,2,4-trimethyl dihydroquinoline and heating. No. 2,451,174. Louis F. Reuter (to The B. F. Goodrich Co.).

**Emulsion polymerization of chloroprene** which comprises incorporating in the emulsion prior to polymerization an ester of an organic acid of the class consisting of keto-acids and dicarboxylic acids which contain the grouping:



which esters contain from 5 to 19 carbon atoms in the molecule. No. 2,451,787. J. R. Vincent (to E. I. du Pont de Nemours & Co.).

*Canadian*

**Process of manufacturing reinforced rubber articles** such as rubber tires and the like which comprises applying to an active-hydrogen-containing fibrous reinforcing structure an active-hydrogen-containing rubber and a cyanate taken from the group consisting of polyisocyanates, polyisothiocyanates, and mixed isocyanate-isothiocyanate compounds, associating the resulting structure with vulcanizable rubber, and subjecting the mass to a vulcanizing temperature. No. 451,804. Lee Roy Herndon (to Canadian Industries, Ltd.).

**Process for making a plastic synthetic rubber-like material** which comprises polymerizing, in aqueous dispersion and in the presence of a member of the group consisting of diazonium salts and compounds capable of generating diazonium salts under the reaction conditions, a polymerizable material which is preponderantly a compound of the group consisting of polymerizable acyclic 1,3-diene hydrocarbons and their monohalogen derivatives. No. 451,813. Herbert Warren Walker (to Canadian Industries, Ltd.).

**Method for improving the processing characteristics of butadiene-styrene interpolymers** which comprises intimately incorporating in said interpolymer a polyvalent metal salt of a terpene mercaptan. No. 451,830. John Richard Vincent (to Canadian Industries, Ltd.).

**Process for bringing a rubbery, unvulcanized polymer** of an acyclic conjugated diene hydrocarbon into condition for the incorporation of compounding ingredients which comprises masticating a mixture of said polymer with a small amount of a polyvalent heavy metal salt of an N-halogen amide wherein the halogen is selected from the class consisting of chlorine, bromine and iodine. No. 451,837. Herman Elbert Schroeder (to Canadian Industries, Ltd.).

**Rubber hydrochloride composition** containing a small amount of the reaction product of an aliphatic aldehyde and an ethylene polyamine, said small amount being sufficient to stabilize the rubber hydrochloride. No. 451,858. James Paul Chittum and George Egbert Hulse, Jr. (to Dominion Rubber Co., Ltd.).

**In a process for producing plastic caoutchouc materials,** the step of adding to the caoutchouc material as mollifying agent a compound corresponding to the formula: $(R_{23}O)_2{:}CH{\cdot}CH_2{\cdot}S_x{\cdot}CH_2{\cdot}CH:(OR_{24})_2$, in which x is greater than 2 but not greater than 6 and $R_{23}$ and $R_{24}$ represent monovalent organic radicals. No. 452,053. Bertil Sixten Groth and Kjell Olof Liljegren (to Mo Och Domsjo Aktiebolag).

**Plasticizing vulcanized rubber scrap** by mechanically working the material under oxidizing conditions with admixed acid material and a mercaptan. No. 452,135. Walter W. Evans (to Boston Woven Hose & Rubber Co.).

**Plasticizing vulcanized rubber scrap** by mechanically working the material under oxidizing conditions with small amounts of admixed acid material and a non-accelerating plasticizing sulfide. No. 452,136. Walter W. Evans (to Boston Woven Hose & Rubber Co.).

**Rubber composition** comprising rubber selected from the group consisting of natural rubber and rubber-like polymers of butadiene, isoprene, piperylene and 2-chloro butadiene, and hydrocarbon resin polymer selected from the group consisting of heat resin polymer and catalytic resin polymer of polymerizable hydrocarbons contained in a hydrocarbon oil which has been physically separated from tar produced in the vapor phase pyrolysis of petroleum oil. No. 452,571. Frank J. Soday (to United Gas Improvement Co.).

## *Specialties

**As a hydrocarbon lubricating oil improving agent,** a halogen-bearing synthetic material obtained by the condensation of a homogeneously halogenated waxy ester with an anhydrous metal salt of a carboxylic acid, said waxy ester being selected from the class consisting of naturally occurring solid and semi-solid waxy esters and synthetic carboxylic acid solid and semi-solid waxy esters, said homogeneously halogenated waxy ester containing a uniform number of halogen atoms per molecule, and said condensation reaction being carried out with an amount of the anhydrous metal salt insufficient to replace all of the halogen in said homogeneously halogenated waxy ester. No. 2,449,547. Gordon D. Byrkit (to The Lubrizol Development Corp.).

**Preparing a lubricating grease** which comprises thoroughly mixing at a temperature sufficiently high to cause the soap to dissolve in the oil, a viscous hydrocarbon oil, grease forming proportions of an aluminum soap of a saturated fatty acid containing between about 10 and 22 carbon atoms in the molecule, and resorcinol, rapidly cooling the heated mixture in a flowing stream by artificial chilling substantially below the normal transition temperature and then allowing the mass to stand. No. 2,449,580. Alan Beerbower and John C. Zimmer (to Standard Oil Development Co.).

**Minimizing the production of foam** in and the priming of steam generators which comprises incorporating with a water therein containing an amount of total solids tending to produce foaming and priming, a quantity of a disulfonamide of a straight chain alkyl sulfonic acid containing more than 11 carbon atoms and a polyamine in sufficient amount to substantially inhibit priming and foaming said sulfonamide not being appreciably soluble in water but capable of being dispersed in water and being substantially nonvolatile with steam. No. 2,449,656. Robert W. Kell (to National Aluminate Corp.).

**Composition for the lubrication of valves** used in service where an acid selected from the group consisting of HCl and HF is in process consisting of a chlorinated paraffin wax prepared from a paraffin wax and containing about 42 per cent by weight of chlorine, and sufficient solid thickening agent selected from the group consisting of graphite and asbestos. No. 2,449,689. Paul H. Carnell (to Phillips Petroleum Co.).

**Lumber having surface layers impregnated** with a composition consisting essentially of alkaline alkali metal phosphate, alkali metal sulfate and alkali metal chloride. No. 2,449,785. Alfred Lippman, Jr., and Rock L. Comstock and Edward B. Benjamin (to Bay Chemical Co., Inc.).

**In a process of flotation** for the separation of metalliferous sulphides, the step of agitating and aerating an aqueous pulp containing said metalliferous sulphides, in the presence of a frothing and a collecting agent for one in the presence of alpha mercapto butyric acid ($HSC_8H_6COOH$) as a depressant. No. 2,449,984. Harold L. Gibbs.

**Improved block grease** possessing anti-charring and anti-glazing properties comprising an intimate anhydrous mixture of about 50 per cent to about 80 per cent of a mineral oil and about 50 per cent to about 20 per cent of soap base, the said base comprising approximately equal quantities of a soap of a hydrogenated rosin of at least 40 per cent saturation and a fatty acid soap, and a diarylamine in an amount sufficient to substantially inhibit oxidational deterioration. No. 2,450,-149. Paul R. McCarthy (to Gulf Research & Development Co.).

**Friction material** comprising asbestos fibre, dried and ground tung pomace, and resin. No. 2,450,171. Thornton R. Stenberg (to Bendix Aviation Corp.).

**Preparing at temperatures attainable in a steam-jacketed kettle a texture-stable gel-type grease** consisting of lithium soap, said lithium base grease being resistant to substantial lowering in consistency when subjected to high shearing stresses which comprises saponifying with a basic lithium compound a blend of major proportion of a soap-forming essentially saturated hydroxy fatty acid glyceride and a minor but substantial proportion of a soap-forming saturated fatty acid. No. 2,450,-219. Harry V. Ashburn and Oney P. Puryear (to The Texas Co.).

**Preparing a texture-stable and water-resistant gel-type grease** consisting of lithium soap as the entire soap content, said lithium base grease being resistant to substantial softening and also resistant to substantial hardening when subjected to high shearing stresses which comprises saponifying with a basic lithium compound at a mildly elevated temperature a blend of a soap-forming hydroxy fatty acid, and a soap-forming saturated fatty acid. No. 2,450,220. Harry V. Ashburn and Oney P. Puryear (to The Texas Co.).

**Lubricating grease composition** comprising a high molecular weight high boiling liquid aliphatic dicarboxylic acid ester within the lubricating oil viscosity range and possessing lubricating propertes, and sufficient metal soap of a soap-forming fatty material selected from the group consisting of hydroxy fatty acids, and hydroxy fatty acid glycerides. No. 2,450,-221. Harry V. Ashburn, Robert S. Barnett and Oney P. Puryear (to The Texas Co.).

**Lubricating grease composition** comprising an oil-soluble high molecular weight high-boiling liquid aliphatic dicarboxylic acid ester within the lubricating viscosity range and possessing lubricatng propertes, and sufficient lithium soap of soap-forming fatty material to thicken said lubricant base, and soap-forming fatty material consisting of a hydroxy soap-forming fatty material selected from the group consisting of hydroxy fatty acids and hydroxy fatty acid glycerides. No. 2,450,222. Harry V. Ashburn, Robert S. Barnett and Oney P. Puryear (to The Texas Co.).

**Preparing a normal barium soap grease** by saponifying a soap-forming fatty acid with barium hydrate in the presence of a mineral oil. No. 2,450,224. Eric A. Bergmann, Harry V. Ashburn and George W. Eckert (to The Texas Co.).

**Preparing a low temperature gel-type lithium base grease** containing a lithium soap of a soap-forming hydroxy fatty acid glyceride. No. 2,450,-254. Oney P. Puryear and Harry V. Ashburn (to The Texas Co.).

**Preparing a low temperature gel-type lithium base grease** containing a lithium soap of a soap-forming hydroxy fatty acid. No. 2,450,255. Oney P. Puryear and Harry V. Ashburn (to The Texas Co.).

**Alkali metal rust-inhibiting grease** comprising a mineral oil, an alkali metal soap and a compound having the general formula: $Y{-}R{-}O(CH_2CH_2O)_8{-}H$ where R represents an aromatic nucleus and Y is a member selected from the group consisting of aliphatic, cycloaliphatic, arylaliphatic and aryl hydrocarbon radicals having at least 4 carbon atoms. No. 2,450,321. Ernest T. White and Reuben Carl Robinson (to Socony-Vacuum Oil Co., Inc.).

**In a primary battery** including a container: the combination of cathode and zinc anode elements in said container, a mass of porous, granular lime filling said container substantially to the top of said electrodes,

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**said lime** including a minor proportion of a hard, permanent material tending to give physical strength and permanence to the granules thereof, and a caustic alkaline electrolyte solution contained in said granular lime mass and having a solution strength of the order of 5 normal. No. 2,450,472. Le Roy S. Dunham and Ernest O. Jegge (to Thomas A. Edison, Inc.).

**Dry-cleaning** emulsion consisting of carbon tetrachloride; water; a water-soluble emulsifying agent; and benzylated lauryl alcohol. No. 2,450,505. John R. Fisher, Jr. (to The Commonwealth Engineering Co. of Ohio).

**Printing ink** comprising a stable dispersion of coloring matter consisting substantially of vehicle-insoluble pigment in a vehicle composed essentially of water emulsified in water-immiscible ink vehicle liquid with a long chain non-aromatic amine containing a linear hydrocarbon chain of at least 15 carbon atoms and having at least 18 carbon atoms attached to a nitrogen atom through carbon bonds, said ink being of the water-in-oil emulsion type and having a yield value and a rate of flow substantially as good as those of an ink composed of the same amounts and kinds of coloring matter and water-immiscible ink vehicle liquid only. No. 2,450,534. Andries Voet (to J. M. Huber Corp.).

**Composition for descaling a ferrous metal surface** comprising hydrogen chloride, an organic nitrogen base selected from the group consisting of pyridine, quinoline, methylquinoline and o-tolnidine, and a water-soluble salt selected from the group consisting of the water-soluble divalent chromium salts and the water-soluble trivalent titanium salts, the balance being water. No. 2,450,861. Harold A. Robinson (to The Dow Chemical Co.).

**In manufacturing selenium rectifier** elements the improvement of incorporating in the selenium layer a minor proportion of iodine compounds of chlorine or iodine compounds of bromine. No. 2,450,886. Charles Alexander Escoffery and Madeline Duane Merva (to Federal Telephone & Radio Corp.).

**In manufacturing selenium rectifier** elements the improvement of incorporating in the selenium layer a minor proportion of a plurality of substances selected from the class consisting of iodine compounds of chlorine and iodine compounds of bromine. No. 2,450,887. Charles Alexander Escoffery (to Federal Telephone & Radio Corp.).

**Aqueous mud-laden drilling fluid** containing an alkali metal stannate to reduce viscosity and to maintain reduced viscosity at temperatures encountered in well drilling. No. 2,450,936. William T. Cardwell, Jr. (to California Research Corp.).

**Improved lubricant** comprising a mineral lubricating oil having incorporated therein a small proportion, sufficient to stabilize said oil, of an oil-miscible alkyl thiophenol methylene thioether. No. 2,451,037. Rush F. McCleary and Stiles M. Roberts (to The Texas Co.).

**Improved lubricating grease composition** comprising a major proportion of a low pour point lubricating mineral oil distillate, a minor proportion of a lithium soap of a saturated fatty acid and an aluminum soap of a saturated fatty acid. No. 2,451,039. Arnold J. Morway and John C. Zimmer (to Standard Oil Development Co.).

**Rejuvenating negative battery plates** of worn-out storage batteries comprising washing the plates to remove all old acid, charging the plates in a 5 to 10 per cent solution containing equal parts of alkali metal salts of sulfates and tartrates for converting the lead sulfate in the plates to spongy lead, filling the pores of the plates with barium hydroxide and waste sulfite liquor and then drying the plates. No. 2,451,087. Alva L. Hindall (to General Motors Corp.).

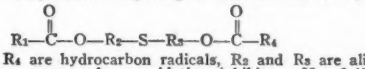
**Manufacture of materials resistant to micro-biological decomposition** which comprises the mono p-chlorophenyl-ether of ethyleneglycol in a material liable to microbiological decomposition. No. 2,451,149. Erich Boehm (one-half to Nipa Laboratories, Ltd.).

**Fungicidal and bactericidal composition** comprising a substance selected from the group consisting of 1-(4'-isopropylbenzyl)-piperazine and its acid salts, and a carrier. No. 2,451,645. Ferdinand B. Zienty and George W. Steahly (to Monsanto Chemical Co.).

**Material normally subject to the deteriorating effect of oxidative rancidity** due to its content of a compound of the group consisting of fatty acids and glycerides of fatty acids containing a fractional percentage of NDGA and phosphoric acid. No. 2,451,748. Henry R. Kraybill and Buell W. Beadle (to American Meat Institute Foundation).

**De-icing composition** consisting of a long chain fatty acid partial ester of sorbitan, selected from the group consisting of sorbitan monopalmitate and sorbitan monostearate, and anhydrous potassium acetate. No. 2,451,814. Theodore Augustine Dissel and Isaac Laird Newell (to United Aircraft Corp.).

**Lubricating grease composition** comprising a thioether derivative,



wherein $R_1$ and $R_4$ are hydrocarbon radicals, $R_2$ and $R_3$ are aliphatic radicals, a lithium soap, and an oxidation inhibitor. No. 2,451,895. Ellis Ross White and Denham Harman (to Shell Development Co.).

**Hydraulic fluid** consisting of the monoethyl ether of ethylene glycol and blown castor oil. No. 2,451,999. Kenneth E. Walker (to E. I. du Pont de Nemours & Co.).

**Aqueous well drilling fluid** containing a gel-forming constituent and a degelling poly-derivative of at least one water-soluble derivative of a normally solid acidic oxide of an element of one of the groups III, IV, V and VI of the periodic system. No. 2,452,021. Truman B. Wayne.

### *Canadian*

**Bleaching and filling leather** by impregnating the leather with an aqueous solution of the condensation product of 1 mol of an aminocarboxylic acid with 1·2·5 mols of a methylol melamine. No. 451,770. William O. Dawson (to American Cyanamid Co.).

**Flux for galvanizing** comprising a chloride of a metal above magnesium in the electromotive force series of the elements, and the balance of the composition being comprised essentially of zinc ammonium chloride and ammonium chloride. No. 451,811. Ernest Russel Boller, Lowell Depp Eubank and Raymond John Kepfer (to Canadian Industries, Ltd.).

**Method for preventing corrosion** in the cooling systems of internal combustion engines which comprises cooling the said engines by means of a medium consisting of an aqueous medium containing from 10 per cent to 20 per cent by weight of ammonia as a freezing point depressant in a de-aerated, hermetically-sealed cooling system. No. 451,829. Edward Payson Bartlett and Hans Christian Duus (to Canadian Industries, Ltd.).

**Liquid soldering flux** comprising zinc chloride, a light hydrocarbon oil, an inorganic base and a wetting agent. No. 451,910. John Burke Tuthill (to Remington Arms Co., Inc.).

**Fire-resistant dust-collecting coating** comprising substantial proportions of a trialkylphosphate and a triarylphosphate. No. 452,208. Joseph W. Spiselman (to Western Precipitation Corp.).

**Fire-resistant, water-soluble, dust collecting composition** comprising substantial proportions of a glycol and of an aliphatic polyhydroxy compound. No. 452,209. Carl W. J. Hedberg (to Western Precipitation Corp.).

## **Textiles*

**Protecting textile materials of cellulosic origin** against attack by mildew and rot which includes the step of depositing on the fibrous surfaces a compound having the formula:

$$(X_m\,C_6H_4\text{—}O\text{—}C_nH_{2n}\text{—}CO\text{—})_w\cdot Y$$

wherein X represents a halogen selected from the group consisting of chlorine, bromine, and iodine, Y represents a member of the group consisting of hydrogen, ammonium and a salt-forming metal, $n$ is an integer from 1 to 3, inclusive, $m$ is an integer not greater than 5, and $w$ represents an integer equal to the valency of Y. No. 2,449,787. Frederick J. Meyer (to The Dow Chemical Co.).

**A fiber** comprising casein and salts of casein and fatty acids. No. 2,450,889. Antonio Ferretti (to Attorney General of the U. S.).

**In the spinning of viscose**, spinning nozzles preventing clogging by adding to at least one of the liquids which come into contact with said nozzles during spinning a small amount of a pyridin compound which is not surface active. No. 2,451,148. Theeuwis Albertus Hendrikus Blaas, deceased, by Johanna Geertrui Blaas (to Naamlooze Vennootschap Kunstzijdespinnerij Nyama).

**Process for wet-spinning of acrylonitrile polymer yarn which comprises** extruding a solution, in a volatile organic solvent, of acrylonitrile polymer containing a major portion of acrylonitrile, through a shaped orifice into a spinning bath consisting of an aqueous 30% to 50% (by weight) solution of calcium chloride. No. 2,451,420. William W. Watkins (to E. I. du Pont de Nemours & Co.).

**Preparing regenerated cellulose film from viscose** which comprises extruding viscose on a support to form a viscose film, drying until the water content of the film is reduced to less than 45% by weight before irreversible gelation takes place, and thereafter subjecting said film to the action of a non-swelling liquid regenerating medium until regeneration of the cellulose is substantially complete. No. 2,451,768. James Burton Nichols (to E. I. du Pont de Nemours & Co.).

### *Canadian*

**Mixing a filamentous** nylon structure with a filamentous cellulose structure and reacting the composite structure with a sufficient quantity of an aldehyde to impart crush-resistance. No. 451,802. Winfield Walter Heckert (to Canadian Industries Ltd.).

**Treatment of textile materials** containing animal fibers to reduce shrinkage during subsequent laundering by mechanically working the textile material with an abrasive powder in the presence of a non-aqueous medium in which said powder is insoluble. No. 451,870. John Bamber Speakman and Emma Whewell (to The Fullers' Earth Union Ltd.).

**Improving the ironing properties of organic substitution derivative of cellulose textile materials** and articles made therefrom, which comprises treating the same with an aqueous solution of boric acid, drying the material, and then subjecting the so treated material to a heat treatment under superatmospheric pressure. No. 451,938. George W. Seymour and George C. Ward (to Camille Dreyfus).

**Improving the ironing and heat-resisting properties of textile materials** comprising filaments and fibers having a basis of a non-thermoplastic textile material, which comprises applying a solution of boric acid to said materials, drying the treated materials and then subjecting them to a heat treatment. No. 451,939. George W. Seymour and George C. Ward (to Camille Dreyfus).

**Production of sheet material** of the suedette type which comprises coating a woven textile fabric with a mixture of a finely divided vinyl polymer and a plasticizer therefor which is substantially a non-solvent for the polymer at atmospheric temperature, but which gels the polymer on heating, distributing textile fibers over the said coating and then heating the materials to cause the coating to gel and anchor the fibers therein. No. 452,032. John Graham and Henry Albert Hirst (to Dunlop Tire & Rubber Goods Co. Ltd.).

**Treating textile materials** by impregnating with a cellulose derivative, for increasing the abrasion resistant qualities of the material, a blown oil plasticizer to reduce the tendency of the cellulose derivative to stiffen such material, a fungicide, and organic cellulose derivative solvent and petroleum plasticizer solvent. No. 452,117. Louis W. Schatz.

**Bleaching and scouring cellulosic textile materials** by circulating an alkaline solution of a hypochlorite, an alkali metal chlorite and a detergent through the material. No. 452,187. George P. Vincent, Archie L. Dubeau and John F. Synan (to Mathieson Alkali Works).

**Producing a pigmented and modified cellulosic stock** adapted for admixture with untreated stock in the manufacture of paper which comprises subjecting an aqueous suspension of cellulosic fibres to the modifying action of a strong solution of calcium chloride. No. 452,573. William L. Craig (to R. T. Vanderbilt Co., Inc.).

## *Agricultural*

**Methylenedioxyphenyl compound** as insecticide and pyrethrin synergist. No. 2,452,188. Oscar F. Hedenburg (to Harold W. Moburg).

**Fungicidal composition** comprising paraformaldehyde and a chlorine derivative of trimethyl acetonitrile having the formula $C_4H_{(9-x)}Cl_x$—CN, where x=1 to 3. No. 2,452,429. Paul J. Carlisle and Wilbie S. Hinegardner (to E. I. du Pont de Nemours & Co.).

**Insecticide** containing methylated naphthalene and 4,4' dichlor-diphenyl-trichlorethane. No. 2,452,759. Julius Hyman (to Velsicol Corp.).

**Inhibiting the discoloration of butt ends of lettuce** during shipment by contacting with a neutral aqueous solution of formaldehyde. No. 2,453,040. Jagan N. Sharma.

**Solidifying DDT** which includes cooling molten DDT without solidification, whereby a supercooled liquid is obtained, and permitting the supercooled liquid to crystallize. No. 2,453,076. Kenneth B. Little and John J. Burton (to J. T. Baker Chemical Co.).

**Prevention and destruction of weeds** by applying a compound conforming to the general formula $Ar.X.CH_2Y$, in which Ar is selected from the group consisting of the phenyl radical, the naphthyl radical and such radicals containing also at least one substituent selected from halogen atoms, nitro groups, and alkyl radicals containing not more than 6 carbon atoms, X is selected from the group consisting of oxygen, sulphur, and —NH—radical, and Y is selected from the group consisting of the carboxy radical and carboxy radicals in which the hydrogen atom is replaced by a water-soluble salt-forming substituent. No. 2,453,983. Wilfred Archibald Sexton and Roland Edgar Slade and William Gladstone Templeman (to Imperial Chemical Industries, Ltd.).

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## *Biochemical*

**Separating gramicidin** from tyrocidine as found in tyrothricin, comprising dissolving the tyrothricin in ethanol, adding phosphotungstic acid to precipitate the tyrocidine, removing the precipitate and adding salt to coagulate the gramicidin, subjecting the precipitate to washing with a dilute solution of ammonium carbonate to remove phosphotungstate and washing and drying. No. 2,453,534. Harold S. Olcott and Heinz L. Fraenkel-Conrat (to U.S.A. by Sec. of Agriculture).

## *Cellulose*

**Continuous process for making alkali cellulose.** No. 2,452,542. William H. Bradshaw and William R. Schmitz, Jr. (to E. I. du Pont de Nemours & Co.).

**Sealing composition** for use between metal parts to be spot-welded, comprising cellulose nitrate; a fugitive solvent mixture comprising butyl acetate, butyl lactate, glycol-mono-ethyl-ether and glycol-mono-methyl-ether; castor oil as a plasticizer; and one electrical conducting material selected from the class consisting of carbon black and aluminum flakes. No. 2,452,805. Paul Sussenbach (to The Presstite Engineering Co.).

**Cellulose ester or ether** plasticized with ethyl alpha-carbethoxyethoxyethyl carbonate. No. 2,453,264. Chessie E. Rehberg (to U. S. A. by Sec. of Agriculture).

**Cellulose butyrate-crotonate.** No. 2,453,275. George W. Seymour, Blanche B. White and Elisabeth Barabash (to Celanese Corp. of America).

**Rendering water-soluble ethers** of cellulose water-insoluble by preparing an aqueous solution of a water-soluble cellulose ether with methyl ether of polymethylol melamine, and heating in the presence of an acidic hardening catalyst. No. 2,453,608. Herbert J. West (to American Cyanamid Co.).

**Thermoplastic composition** consisting of a cellulose ether, a plasticizer therefor, and methyoxy phenol lactone as a stabilizer. No. 2,454,273. Richard F. B. Cox (to Hercules Powder Co.).

## *Ceramics*

**Metal sealing glass** consisting of $B_2O_3$; $Al_2O_3$; $TiO_2$; $ZrO_2$; $Na_2O$; $K_2O$; $Li_2O$; and $SiO_2$. No. 2,454,607. Charles E. Leberknight and Eugene C. Ostrander (to Kopp Glass, Inc.).

## *Coatings*

**Coatings** comprising the reaction product of a fatty drying oil with a polyhydric alcohol ester of a cyclo-pentadiene-maleic adduct and a reactant in amount sufficient to impart to the ester solubility in fatty drying oils, said reactant selected from the group consisting of monobasic fatty acids having 5 to 22 carbon atoms in the chain and their partial esterification products with a polyhydric alcohol. No. 2,452,992. William H. Butler (to Bakelite Corp.).

**Producing a hard, tough and adherent coating** on objects consisting at least mainly of titanium which comprises subjecting said objects to the action of a molten alkali metal cyanide. No. 2,453,896. Reginald S. Dean (to Chicago Development Co.).

**Baking enamel** comprising, an alkyd resin and a volatile hydrocarbon thinner. No. 2,454,123. Charles J. Bartholomew (to Ford Motor Co.).

**Composition of half-ester** of styrene-maleic anhydride coplymer and a solvent for protection of metal surfaces. No. 2,454,284. Joseph S. Kirk (to E. I. du Pont de Nemours & Co.).

### *Canadian*

**Preparing coating compositions** by forming an aqueous suspension of a material from the group consisting of minerals and pigments, incorporating a raw starch therein and subjecting the resulting mixture to the action of an amyloytic enzyme. No. 452,906. William L. Craig (R. T. Vanderbilt Co., Inc.).

## *Detergents and Surface-Active Media*

**Continuous process for producing soap** by continuously forming a water-in-oil type emulsion by continuously adding approximately stoichiometrical proportions of a concentrated, aqueous, caustic alkali solution and of lower alkyl esters of higher fatty acids to an agitated body of such emulsion, passing this emulsion through an enclosed space until nearly complete saponification of the fatty acids has taken place, and then reducing the pressure on the reaction mixture as it emerges from said enclosed space sufficiently to evaporate off the major part of the lower alcohol and water. No. 2,452,724. George B. Bradshaw.

**Making soap** by saponifying a mixture of lower alkyl esters of higher fatty acids and an aqueous soap solution by adding caustic alkali in several successive stages under autogenous pressure and continued agitation, adding to the resulting product a cool, dilute, aqueous solution of an electrolyte, permitting said mixture to settle and then separating the neat soap from the nigre therein. No. 2,452,725. George B. Bradshaw.

**Treating an oil well** by subjecting the porous strata adjacent the well of calcareous material to a fatty acid containing at least 10 carbon atoms to render the porous strata preferentially oil wettable and water repellent. No. 2,452,736. Allen G. Eickmeyer (to Charles M. McKnight).

**Liquid consisting** of a solution of a sodium alkyl naphthalene sulfonate and a cyclic ketone selected from the group consisting of camphor, isophorone, cyclohexanone and 1,1,3 trimethyl-cyclohexanone. No. 2,453,022. Lee Leiserson (to Virginia Smelting Co.).

**Preparing a dispersion** of carbon black in an organic substance by mixing compacted carbon black with an organic substance which wets carbon black, and grinding. No. 2,453,557. Andries Voet (to J. M. Huber, Inc.).

**Water-soluble, polymeric detergents** formed by condensing by heating a phenol having the formula: $RC_6H_4OH$ in which R is a saturated hydrocarbon substituent containing 8 to 18 carbon atoms and formaldehyde, and then reacting therewith an akylene oxide from the class consisting of ethylene oxide, propylene oxide, and butylene oxide. No. 2,454,541. Louis H. Bock and James L. Rainey (to Rohm & Haas Co.).

**Water-soluble, polymeric detergents** formed by condensing by heating a phenol from the class consisting of ortho-substituted and para-substituted phenols having the formula: $R'C_6H_4OH$ in which R' is a saturated hydrocarbon substituent containing 8 to 18 carbon atoms and formaldehyde, then reacting therewith an alkylene oxide from the class consisting of ethylene oxide, propylene oxide, and butylene oxide, then esterifying the resulting alcohol with a polybasic acid from the class consisting of sulfuric and phosphoric acids, and finally neutralizing to form a salt of a metal from the class consisting of alkali and alkaline earth metals. No. 2,454,542. Louis H. Bock and James L. Rainey (to Rohm & Haas).

**Modified phenol-formaldehyde condensation product** having detergent properties wherein the phenol-formaldehyde condensate is an oily to brittle resinous condensation product of formaldehyde and phenol from the class consisting of ortho-substituted and para-substituted phenols having the formula: $R'C_6H_4OH$ in which R' is a saturated hydrocarbon substituent containing 4 to 18 carbon atoms, and wherein the modification of said condensation product consists of the group —(RO)$_y$—R—$SO_3M$ replacing the original phenolic hydrogen atoms and being attached to each phenol nucleus in said condensate through the phenolic oxygen, wherein R in both occurrences is the same saturated alkylene group containing 2 to 4 carbon atoms, $y$ has a value of 0 to 19 and M is a metal from the class consisting of alkali and alkaline earth metals. No. 2,454,543. Louis H. Bock and James L. Rainey (to Rohm & Haas Co.).

**Modified phenol-formaldehyde condensation product** having detergent properties wherein the phenol is ortho-substituted and para-substituted brittle resinous condensation product of formaldehyde and a phenol from the class consisting of ortho-substituted and para-substituted phenols, having the formula: $R'C_6H_4OH$ in which R' is a saturated hydrocarbon substituent containing 8 to 18 carbon atoms and wherein the modification of said condensation product consists of the group —(RO)$_y$—R—OCO—R"—(COOM)$_x$ replacing the original phenolic hydrogen atoms and being attached to each phenol nucleus in said condensate through the phenolic oxygen atom wherein R in both occurrences is the same saturated alkylene group containing 2 to 4 carbon atoms, R" is a saturated hydrocarbon radical, containing 1 to 7 carbon atoms, from the class consisting of alkylene and arylene radicals, $y$ has a value of 0 to 20, M is a metal from the class consisting of alkali and alkaline earth metals, and $x$ has a value of 1 to 2. No. 2,454,544. Louis H. Bock and James L. Rainey (to Rohm & Haas Co.).

**Modified phenol-formaldehyde condensation product** having surface-active properties wherein the phenol ortho-substituted and para-substituted having the formula: $R'C_6H_4OH$ in which R' is a saturated hydrocarbon substituent containing 4 to 18 carbon atoms, and wherein the modification consists of —(RO)$_y$—R—O—$CH_2CH_2COOM$ replacing the original phenolic hydrogen atoms and being attached to each phenol nucleus in said condensate through the phenolic oxygen atom wherein R in both occurrences is the same saturated alkylene group containing 2 to 4 carbon atoms, $y$ has a value of 0 to 20 inclusive, and M is a metal from the class consisting of alkali and alkaline earth metals. No. 2,454,545. Louis H. Bock and James L. Rainey (to Rohm & Haas Co.).

**Preparing linear, water-soluble, polymeric, surface-active polyesters** by preparing a resinous linear polyester by esterifying an alkane-diol containing 6-18 carbon atoms and an equivalent amount of maleic acid and reacting said linear polyester with a water-soluble bisulfite at the double bond of the maleic acid. No. 2,454,546. Louis H. Bock and James L. Rainey (to Rohm & Haas Co.).

**Preparing surface-active quaternary ammonium salts** by reacting an epihalohydrin of the general formula $CH_2 \cdot \underset{\displaystyle O}{\underset{|}{C}}R \cdot CH_2X$ in which R is a member of the class consisting of hydrogen and methyl groups and X is a member of the group consisting of chlorine and bromine, and a secondary amine having the general formula, R'NHR", in which R' is a member of the group consisting of methyl and ethyl groups and R" contains 8-18 carbon atoms and is a hydrocarbon group from the class consisting of alkyl groups and aralkyl groups, and continuing the heating to form said quaternary ammonium salt molecules of both the epihalohydrin and the amine. No. 2,454,547. Louis H. Bock and Alva L. Houk (to Rohm & Haas Co.).

## *Dyes, Pigments*

**Metallizable monoazo dyes.** No. 2,452,171. Fritz Straub, Willy Widmer and Hermann Schneider (to Ciba, Ltd.).

**Disazo dyestuffs.** No. 2,452,263. Rudolph Ruegg (to Ciba, Ltd.).

**Producing a coalesced phthalocyanine coloring material** by reacting in the absence of moisture an aryl-orthodinitrile with a compound of a metal in the presence of phthalocyanine pigment in the mixture of a substratum comprising a calcined, anhydrous, white, inorganic pigment substance selected from the group consisting of titanium oxide and zirconium oxide. No. 2,452,606. Alfred Siegel (to E. I. du Pont de Nemours & Co.).

**Producing an iron oxide pigment** by mixing ground iron ore with concentrated sulphuric acid so as to form a reaction product which is fluid enough at elevated temperature that it can be discharged as a fluid from the reaction zone and will form a granular sensibly dry material upon cooling and then calcining to convert the ferric sulphate to $Fe_2O_3$ and to form an iron oxide pigment. No. 2,452,608. George B. Smith (to Minnesota Mining and Mfg. Co.).

**Producing a color lake** comprising mixing a relatively insoluble hydrous basic zirconium compound as a substratum and a solution containing a dye having a sulphonic acid radical. No. 2,452,616. Eugene Wainer and Henry L. Van Mater (to The Titanium Alloy Mfg. Co.).

**Indigoid vat dyestuff.** No. 2,453,225. Kurt Hoelzle and Eduard Kambli (to Ciba, Ltd.).

**Anthrimide carbazole vat dyestuffs.** No. 2,453,232. Walter Kern, Paul Sutter, Eduard Moergeli and Theodor Holbro (to Ciba, Ltd.).

**Dyestuffs of the anthraquinone series.** No. 2,453,285. Samuel von Allmen and Hans Eggenberger (to Sandoz, Ltd.).

**Acid treatment of anthraquinone thiazole vat dyestuffs.** No. 2,453,410. John F. Cullinan and Lawrence D. Lytle (to American Cyanamid Co.).

**Barium lake pigment** by treating an aqueous slurry of an azo color. No. 2,453,490. Jack Beniah Callaway and Donald Bernard Killiam (to E. I. du Pont de Nemours & Co.).

**Composition to be used in textile coloring** comprising a pigment dispersed in an emulsion in which the inner phase comprises a dispersion of a vulcanized vegetable oil in a water-immiscible organic liquid, and the outer phase comprises an aqueous dispersion of material comprising the product obtained by adding urea and an aldehyde to a protein dispersion. No. 2,453,752. Fred G. La Piana and Herman S. Bosland (to Stein, Hall & Co., Inc.).

**Manufacture of vattable, sulfur-containing dyestuffs of the phthalocyanine series,** which comprises heating in nitrobenzene, a phthalocyanine compound selected from the group consisting of metal- and metal-free phthalocyanines containing sulphonyl-chloride groups, in the presence of a phosphorus polysulfide selected from the group consisting of phosphrous pentasulfide and the sulfides formed in situ at the specified reaction temperature from a mixture of red phosphorus and sulfur to convert the sulfonyl-chloride radicals of the phthalocyanine compound into vattable, sulfur-containing radicals. No. 2,453,953. Clifford Wood (to Imperial Chemical Industries, Ltd.).

**Golden brown pigment** obtained by coupling tetrazotized dichlor benzidine with phenyl-methyl-pyrazolone in weak caustic soda solution containing a dispersing agent and cupric hydroxide, neutralizing and separating

the precipitate. No. 2,454,266. Edward Armatys (to Interchemical Corp.).

**Producing pattern effects on textile fabrics** by printing with a wet printing paste containing polymerizable melamine formaldehyde resin resist which, upon polymerization, immobilizes the glazed fibres of a polished cloth, subjecting the cloth to heat without polymerizing the resin enough to immobilize the surface fibres to dry the printed cloth frictionally polishing the cloth between rotating, heated pressure rolls while dry and producing a unidirectional glaze on the entire printed and unprinted areas of the cloth surface, heating the polished cloth and polymerizing the resin and immobilizing the glazed surface fibres. No. 2,454,391. Albert S. Jones and Gerald B. Stackpole (to Cranston Print Wrks. Co.).

**Converting a vat dyestuff**, characterized by the presence of a dibenzopyrenequinone nucleus, into a very finely divided particles which comprises forming a slurry with sulfuric acid, agitating this slurry until conversion of the dyestuff to the substantially insoluble sulfate is complete and hydrolyzing the sulfate to the dyestuff. No. 2,454,433. John F. Cullinan and Lawrence D. Lytle (to American Cyanamid Co.).

**Manufacture of textile chrome-printing pastes** containing hexavalent chromium, chromable dyestuff and gum of vegetable origin. No. 2,454,623. Charles Babey, Willi Thommen and Emil Stocker (to J. R. Geigy—A.G.).

**Gray acid anthraquinone dyestuffs.** No. 2,454,679. Glen M. Smyth (to American Cyanamid Co.).

**Metallizable polyazo dyestuffs.** No. 2,454,683. Walter Wehrli and Charles Petitjean (to Sandoz, Ltd.).

### *Canadian*

**Reacting on a fibre a metal carbonyl of the iron group** and a mordant dyestuff capable of forming a coloured metal complex compound therewith. No. 452,669. Harry Wilhelm Grimmel (to General Aniline & Film Corp.).

**Improving the fastness to acid fumes** of colorations on organic derivative of cellulose textile materials dyed with water-insoluble anthraquinone dyes of the dispersol type, which comprises forming a water-insoluble tannic acid salt of a metal on said coloured organic derivative of cellulose textile material. No. 452,912. Robert Burns (to Camille Dreyfus).

## *Equipment*

**Centrifugal liquid-vapor separator.** No. 2,452,465. Burton S. Hughes (to Zaremba Co.).

**Rotary vane pump.** No. 2,452,471. Guy A. Jones (to Eaton Pump Mfg. Co.).

**Contacting apparatus** for catalytic processes. No. 2,453,592. David H. Putney (to Stratford Development Corp.).

**Apparatus** for separating entrained solids from gases. No. 2,453,593. David H. Putney (to Stratford Development Corp.).

**Rotary drum filter.** No. 2,454,134. Ambrose L. Burleson.

**Corrosion resisting valve.** No. 2,454,160. Otto W. Greene (to Pfaudler Co.).

**Plug valve.** No. 2,454,389. Oystein Jacobsen (to The Duriron Co., Inc.).

**Centrifugal pump.** No. 2,454,390. Oystein Jacobsen (to The Duriron Co., Inc.).

## *Explosives*

**Explosive which** comprises glycerin, water and hydrogen peroxide. No. 2,452,074. Edward S. Shanley and Hans O. Kauffmann (to Buffalo Electro-Chemical Co., Inc.).

**Incendiary composition** composed of iron oxide scale, barium nitrate, and aluminum. No. 2,452,091. David L. Woodberry, William W. Howerton and Alver Dunbar (to Sec. of War, U.S.A.).

**Explosive composition** comprising water soluble explosive inorganic oxidizing salts, an explosive liquid nitric ester, nitrocellulose, polyethylene glycol ethers of at least 8 carbon atoms joined together and of at least 2 ethenoxy groups joined together, and moisture. No. 2,454,643. Stanley Fordham and John L. Moilliet (to Imperial Chemical Industries, Ltd.).

## *Food*

**Plasticized "prolamine-base" protein composition** comprising plasticized "prolamine-base" protein having as plasticizer organic carboxylic amide substituted on the nitrogen atom with at least one alkyl radical containing an amine radical selected from the group consisting of —$NH_2$ and =NH. No. 2,452,313. Willard L. Morgan and Carl R. Faelten (to American Maize-Products Co.).

**Plasticized "prolamine-base" protein composition** comprising plasticized "prolamine-base" protein having as plasticizer therefor ether phenol in which the total number of carbon atoms in the molecule is not in excess of 18. No. 2,452,314. Willard L. Morgan (to American Maize-Products Co.).

**Plasticized "prolamine-base" protein composition** comprising plasticized "prolamine-base" protein having as plasticizer cyclic imide in which the total number of carbon atoms in the molecule is in the range from 4 through 14. No. 2,452,315. Willard L. Morgan and Carl R. Faelten (to American Maize-Products Co.).

**Methyl ether of vitamin A.** No. 2,452,386. Nicholas A. Milas (to Research Corp.).

## *Inorganic*

**Making a calcium aluminate sinter** from finely divided, highly siliceous aluminum ore and limestone. No. 2,452,041. Kelly L. Elmore (to Tennessee Valley Authority).

**Preparing uranium deuteride** by reaction of deuterium oxide, a reducing metal, and uranium metal. No. 2,452,139. Amos S. Newton (to U.S.A. by U.S. Atomic Energy Comm.).

**Treating natural brines** to remove the soluble halides and sulphates by bringing the said brines into contact with the base exchange zeolitic material in which the exchange metals are silver and barium. No. 2,452,179. Albert L. Bunting.

**Obtaining an improved hydrolysate** from a concentrated, hydrolyzable titanium salt solution, containing seed nuclei adapted to accelerate its hydrolysis, comprising heating said solution after it has been nucleated to increase its colloidal $TiO_2$ content. No. 2,452,390. Carl Marcus Olson (to E. I. du Pont de Nemours & Co.).

**Production of an $SO_2$ containing gas** for the manufacture of sulfuric acid by the contact process by burning a finely divided stream of waste sulfuric acid containing hydrocarbonaceous impurities, introducing into said burning material as a finely divided spray a waste solution of iron sulfate, thermally decomposing said waste acid and said iron sulfate, allowing a major part of the iron oxide formed to settle out of the gases, cooling and removing a major part of the heat in said gases, then removing substantially all of said iron oxide dust from said gases, scrubbing and further cooling said gases with a weak solution of sulfuric acid and recovering a gas containing a minimum of 10% $SO_2$. No. 2,452,517. Harold E. Broughton (to Chemical Construction Corp.).

**Apparatus for compressing gaseous fluorine.** No. 2,452,526. Sidney G. Osborne (to Hooker Electrochemical Co.).

**Dielectric composition** comprising an alkaline earth titanate, an alkaline earth stannate and an alkaline earth zirconate. No. 2,452,532. Eugene Wainer (to The Titanium Alloy Mfg. Co.).

**Iodized salt composition**, stabilized against iodine loss on storage, comprising common salt, an inorganic iodide, and activated carbon. No. 2,452,641. William H. Engels (to Merck & Co., Inc.).

**Prevention of corrosion in hydrogen fluoride catalytic organic reactions** by injecting at a plurality of intermediate points a halide of a metal of groups IV and V of the periodic table. No. 2,452,812. Aaron Wachter (to Shell Development Co.).

**Producing calcium hydrides by distillation.** No. 2,452,913. Dick Duffey (to U.S.A. by U.S. Atomic Energy Comm.).

**Flux embodying boric acid** and an alkali fluorine compound and an acid of pentavalent phosphorus and the alkali metal salts thereof. No. 2,452,995. Lionel Cinamon.

**Manufacture of bead-form catalyst.** No. 2,453,084. Henry Trueheart Brown (to Socony-Vacuum Oil Co., Inc.).

**Making a substantially alkali-free hydrogel catalyst.** No. 2,453,585. John W. Payne, Thomas P. Simpson and James I. Butzner (to Socony-Vacuum Oil Co., Inc.).

**Hydrated lime product** and method of making the same. No. 2,453,637. Leonard John Minnick (to G. and W. H. Corson, Inc.).

**Accelerating alumina hydrosol formation by aeration.** No. 2,453,847. Charles N. Kimberlin, Jr. (to Standard Oil Development Co.).

**Aluminum phosphate binder** consisting of an aqueous aluminum phosphate solution and calcium oxalate. No. 2,454,056. Herbert H. Greger.

**Preparation of an adsorptive beta alumina** suitable for use in catalysis which comprises reacting an alumina of the gamma system of Haber, in the absence of metal oxide isomorphous with alpha alumina with a compound of an alkali metal selected from the group consisting of sodium potassium and rubidium until the material shows the X-ray diffraction pattern of beta alumina of the general formula $R_2O \cdot 11Al_2O_3$, R representing the alkali metal. No. 2,454,227. Albert E. Smith and Otto A. Beeck (to Shell Development Co.).

**X-ray screen** coated with zinc sulfide, cadmium sulfide with a trace of silver. No. 2,454,499. William H. Byler and Clayton C. Carroll (to United States Radium Corp.).

**Production of granular molybendena-alumina catalysts** by breaking alumina prepared from an alkali aluminate solution into granules, activating by partial dehydration removing alkali metal salts from the activated granules by leaching, further dehydrating and impregnating the substantially alkali-free alumina granules with molybdenum oxide. No. 2,454,724. Miroslav W. Tamele, Vanan C. Irvine and James F. Mahar (to Shell Development Co.).

**Making magnesium oxide** in solidified fused form which comprises dripping molten magnesium into an atmosphere of oxygen whereby the drops of magnesium burn forming fused magnesium oxide. No. 2,454,733. Alvin D. Dahl (to Dow Chemical Co.).

## *Leather*

**In a process for modifying leather**, the step comprising thoroughly impregnating the leather with a solution of a sulfonated polymeric composition formed by reacting a polymerizable unsaturated carboxylic acid with a polymerizable olefin containing an aromatic substituent and sulfonating the product. No. 2,452,536. Joseph S. Kirk (to E. I. du Pont de Nemours & Co.).

## *Medicinal*

**Physiologically active derivative of pyridoxine.** No. 2,453,944. Esmond E. Snell (to Research Corp.).

### *Canadian*

**Preparing substances having penicillin activity** by condensing a *d*-penicillamine with a 4-alkoxymethylene-5 (4)-oxazolone having in the 2-position a monovalent organic substituent of the class consisting of saturated, unsaturated and substituted hydrocarbon radicals in the presence of a nitrogenous liquid condensing agent, and recovering the active condensation product thus formed. No. 452,873. Stanton Avery Harris and Karl Folkers (to Merck & Co., Inc.).

## *Metals, Ores*

**Electrodepositing palladium** by dissolving freshly precipitated dichlorodiamine palladium in an aqueous solution of cyanide of the group consisting of sodium cyanide and potassium cyanide and electrolysing. No. 2,452,308. George C. Lambros.

**Bath for electrolytic deposition of indium** which consists of a solution resulting from dissolving indium hydroxide in formamide. No. 2,452,361. John Robert Dyer, Jr. (to The Indium Corp. of America).

**In a method of reacting a solid metal alloy** with a molten chloride of a metal having a substantially lesser affinity for chlorine than at least one ingredient of said alloy the improvement which comprises contacting said alloy in a finely comminuated form with a molten mixture of said chloride with at least one chloride selected from the group consisting of the alkali metal chlorides and the alkaline earth metal chlorides. No. 2,452,665. William J. Kroll and Frederick E. Bacon (to Electro Metallurgical Co.).

**Producing magnesium base alloys** containing zirconium wherein alloying is effected by reacting the magnesium with at least one substance selected from the group consisting of double compounds and mixtures of fluorides of the elements potassium and zirconium. No. 2,452,894. Charles J. P. Ball, Alfred Claude Jessup, Edward Frederick Emley and Joseph Beattie Wilson (to Magnesium Elektron, Ltd.).

**Introducing zirconium into magnesium** and magnesium base alloys consisting of a fused mixture of one alkali metal chloride, zirconium fluoride, and one fluoride of the group consisting of potassium fluoride and sodium fluoride. No. 2,452,914. Edward Frederick Emley (to Magnesium Elecktron, Ltd.).

**In nitriding stainless steel**, cracking ammonia gas, mixing uncracked ammonia therewith, heating to form moisture from any available oxygen present with the ammonia, removing by drying, then passing the preheated and predried mixture of gases over the stainless steel while held at nitriding temperature. No. 2,452,915. Alexander L. Feild (to Armco Steel Corp.).

**Smelting titaniferous iron ore** by subdividing the ore, mixing with coking coal and a solid, non-siliceous alkali-metal compound giving a fusible slag, then reducing the ore and coking the coal to form an iron sodium titanate dispersion, adding a substantial proportion of a flux consisting of an alkali-earth-metal compound, then separating the iron from the coke by burning out the latter. No. 2,453,050. Forrest L. Turbett (to Eagle-Picher Co.).

**Treating sheet steel** by running quickly thru an aqueous acid washing bath containing chromic acid and scrubbing. No. 2,453,429. Daniel A. Gorman, Sr.

**Magnesium-base alloy** comprising magnesium, lithium, and less than 0.1% of sodium. No. 2,453,444. Alfred C. Loonam (to Mathieson Chemical Corp.).

**Producing modified electronickel.** No. 2,453,757. Louis Secondo Renzoni (to International Nickel Co., Inc.).

**Protection of metallic surfaces** having as a major constituent a metal chosen from the group consisting of copper, zinc and cadmium, by treating the surface with an aqueous solution consisting of an alkali chromate and an alkali cyanide. No. 2,453,764. Eugene Snyder (to American Chemical Plant Co.).

**Coating a copper-base article with aluminum-base metal** which consists in applying a thin barrier layer of at least one of the metals of the class consisting of nickel, iron, cobalt, manganese and chromium. No. 2,453,772. Marshall G. Whitfield and Victor Sheshunoff (to Fairchild Engineer and Airplane Corp.).

**Recovering zinc from zinciferous materials** involving the treatment of the zinciferous material with a cyclic acid zinc sulfate solution and electrodeposition of zinc therefrom. No. 2,454,142. John T. Ellsworth.

**Manufacturing molybdenum** comprising reducing a compound selected from the group consisting of molybdenum trioxide and ammonium molybdate to an oxide lower than said trioxide, doping with a small percentage of boric oxide, and reducing in hydrogen. No. 2,454,322. Charles V. Iredell and Robert J. Enrico (to Westinghouse Electric Corp.).

**Treatment of gold- and silver-bearing ores, residues and other products** by forming the finely divided material into a charge containing carbonaceous material, a source of sulphur, and a large amount of a soluble chloride such as common salt; roasting this to convert an economic proportion of the gold present into a form amenable to subsequent cyanide treatment; extracting the gold with cyanide; and then forming the treated residues into a charge containing carbonaceous material, a source of sulphur and a large proportion of soluble chloride such as common salt; roasting at a higher temperature and extracting soluble gold from the roaster calcines obtained. No. 2,454,336. Arthur Frederick Bernard Norwood.

*Canadian*

**In the method of producing** molten zinc metal by smelting zinc ore in a blast furnace to form a gaseous mixture containing zinc vapour, carbon dioxide and carbon monoxide, the improvement which comprises maintaining the gaseous mixture during its passage from the blast furnace to the condenser at a temperature above that at which the zinc vapour and the carbon dioxide can react with each other and thus prevent oxidation of an objectionable amount of the zinc vapour to zinc oxide. No. 452,694. Stanley Robson and Stephen Esslemont Woods and Leslie Jack Derham (to The National Smelting Co., Ltd.).

**In the method of condensing zinc vapour from a gaseous mixture obtained by smelting zinc ore,** the gaseous mixture containing zinc vapour, carbon monoxide, and a substantial amount of carbon dioxide, the improvement which comprises bringing the gaseous mixture while still highly heated into intimate shock-chilling contact with molten lead in a condensing zone. No. 452,695. Stanley Robson and Leslie Jack Derham (to The National Smelting Co., Ltd.).

**Treating alunite and similar ores containing iron, titanium and silica impurities,** to recover their valuable constituents, which comprises crushing and screening the ore, heating in an oxidizing atmosphere until the sulphur trioxide combined with the alumina is driven off, leaching the residue with water so that a solution of potassium sulphate is obtained, separating the residual insoluble compounds containing alumina, silica, iron and titanium components, digesting said residual compounds with an acid, heating the acid solution until excess acid is removed, separating the acid solution of the aluminum and iron components from the insoluble silica and titanium components, treating the said solution so as to precipitate aluminum and iron hydroxides, separating said hydroxides from said solution and treating them with potassium hydroxide to convert the aluminum hydroxide to soluble potassium aluminate, separating the insoluble iron, adding carbon dioxide to convert the soluble aluminum to insoluble aluminum hydroxide, and heating said aluminum hydroxide to convert it into pure aluminum oxide. No. 452,736. Robert Clarence Haff (to Elnathan H. Steinman to Ralph W. Johnston).

**Recovering sulphur** from free sulphur bearing ores by crushing, placing in wheeled cars having screened bottoms, forcing beneath a spray of hot kerosene, collecting the solution flowing from the screened bottoms of said cars, chilling the collected solution to precipitate the sulphur therefrom. No. 452,790. George W. Tweeddale.

**Separating copper and nickel** in masses containing copper, nickel and sulphur by establishing a molten mass, subjecting said molten mass to slow cooling to obtain a partially cooled and solidified mass, crushing, comminuting in a saturated aqueous calcium hydroxide solution until about 19% to about 30% of said mass is retained on a 325-mesh screen, subjecting said comminuted mass to froth flotation in saturated aqueous calcium hydroxide solution in the presence of pentasol xanthate, pine oil, and sodium silicate to produce a copper concentrate and a nickel concentrate and removing magnetic material from said nickel concentrate to obtain a final nickel concentrate containing about 71% nickel and about 1.9% copper. No. 452,861. George Alan Harcourt and William Kelvin Sproule (to International Nickel Co. of Canada, Ltd.).

**Treating mixtures** containing copper, nickel and sulphur to obtain each in crystalline sulphide form by establishing a molten mass containing copper, nickel and sulphur, cooling until primary crystals of a metal sulphide form in said mass to obtain a partially solidified mass containing primary crystals of a first metal sulphide, subjecting said partially solidified mass to further cooling in a regulated manner to cause further amounts of said first metal sulphide to crystallize out of the mass and to diffuse and become associated with the said primary crystals of said first metal sulphide and to obtain a solid mixture of crystals of said first metal sulphide substantially chemically free from a second metal sulphide and a matrix of said second metal sulphide substantially chemically free from said first metal sulphide and comminuting said solid mixture to obtain crystals of said first metal sulphide substantially chemically and mechanically free of said second metal sulphide and crystals of said second metal sulphide substantially, chemically and mechanically free of said first metal sulphide. No. 452,862. William Kelvin Sproule and George Alan Harcourt (to International Nickel Co. of Canada, Ltd.).

**Concentrating precious metals** present in untreated matter containing insufficient sulphur to combine with all the base metals by slowly cooling fused untreated matte until solidification occurs whereby a mechanical mixture of sulphides and metallic particles is obtained, comminuting, separating metallic particles from the sulphides, fusing with green furnace matte, bessemerizing, slowly cooling to solidification, comminuting, separating into magnetic and non-magnetic fractions, and recovering precious metals from said magnetic fraction by electrolysis. No. 452,863. William Kelvin Sproule and George Alan Harcourt (to International Nickel Co. of Canada, Ltd.).

**Chlorinating chromium bearing material** containing magnesium which comprises chlorinating said material at a temperature sufficiently high to cause volatilization of magnesium chloride. No. 452,886. Irving Elkin Muskat (to Pittsburgh Plate Glass Co.).

**Continuous method of chlorinating a chromium bearing ore** which comprises chlorinating a mixture of said ore and carbon in the reaction zone of a reactor and introducing said ore, chlorine and carbon into the reactor at such a rate that sufficient heat is evolved from the reaction to maintain the temperature at not less than 850°C without externally heating the zone, whereby chromium chloride is formed and volatilized. No. 452,887. Irving Elkin Muskat (to Pittsburgh Plate Glass Co.).

**In the production of sponge iron by heating and reducing iron oxide containing material while passing the material downwardly through a shaft,** a gas rich in carbon monoxide being admitted into the lower portion of the shaft from a cupola furnace containing coal heated to incandescence and a gas rich in carbon dioxide being drawn off to the cupola at a higher level of the shaft, while air is admitted at a still higher level in order to effect preheating of the material in the upper portion by combustion of carbon monoxide, the method of drawing off excess of gas from the shaft below the inlet openings for the combustion air for regulating the temperature in the combustion zone. No. 452,904. John August Benjamin Odberg (to Stora Kopparbergs Bergslags Aktiebolag).

**Method of feeding and drying coal** for carburetor in gas reduction for production of metals such as iron sponge. No. 452,905. Einar Louis Améen and Helge Oskar Kihlander (to Stora Kopparsbergs Bergslags Aktiebolag).

## *Organic*

**Monomeric addition products** of an ester of acrylic acid and a monhydric alcohol and a compound selected from the class consisting of drying oil fatty acids having conjugate olefinic bonds and esters thereof. No. 2,452,029. Herman A. Bruson and Warren D. Niederhauser (to Röhm & Haas Co.).

**Manufacture of high-boiling mercaptans** by catalytic addition of hydrogen sulfide to an olefin polymer fraction having not less than 10 and not more than 14 carbon atoms per molecule, producing a crude mercaptain oil, subjecting said crude mercaptain oil to extraction with a sodium hydroxide-methanol-water solvent to effect the solution of the mercaptans. No. 2,452,040. Harry E. Drennan (to Phillips Petroleum Co.).

**Di-monoethanolamine salts of N,N-di-substituted sulfo-succinamic acids** having, as one N-substituent, an open-chain hydrocarbon radical of 10 to 18 carbon atoms, and as the other N-substituent, the methyl radical. No. 2,452,043. Lawrence H. Flett (to Allied Chemical & Dye Corp.).

**Brominating organic compounds** by reacting bromine with an organic compound in liquid sulphur dioxide. No. 2,452,154. John Ross (to Colgate-Palmolive-Peet Co.).

**Preparing nitriles** of the formula $R(CN)n$, R being a hydrocarbon radical having from 1 to 8 carbon atoms, $n$ being an integer from 1 to 2 inclusive which comprises reacting ammonia with an aldehyde of the formula $R(CHO)n$ in the presence of a metallic cobalt catalyst. No. 2,452,187. William F. Gresham (to E. I. du Pont de Nemours & Co.).

**Production of oxygenated organic compounds** by subjecting a saturated aliphatic hydrocarbon containing 2 to 5 carbon atoms per molecule to the action of oxygen in the presence of hydrogen bromide. No. 2,452,326. Frederick F. Rust and William E. Vaughan (to Shell Development Co.).

**In the preparation of methyl chloroacetate,** the improvements comprising reacting monoethylene glycol mono butyl ether and chloroacetic acid, in the presence of a mineral acid as a catalyst, to form monoethylene glycol mono butyl ether chloroacetate, then reacting the monoethylene glycol monobutyl ether chloroacetate then reacting the monoethyleneglycol monobutyl ether chloroacetate with an excess of methanol in the presence of sulfuric acid as a catalyst to give a mixture of monoethylene glycol mono butyl ether and chloroacetic acid methyl ester plus methanol; and fractionating. No. 2,452,350. William P. Bitler, Thomas C. Aschner and Leonard Nicholl (to Kay-Fries Chemicals, Inc.).

**Manufacture of phenols or salts thereof** by preparing a solid mixture of an alkali metal salt of the sulphonic acid corresponding to the phenol desired, a caustic alkali and an additional particulate solid substance selected from the group consisting of the normal alkali metal salts of sulphurous acid and of sulphuric acid. No. 2,452,404. Daniel Tyrer.

**In a process of refining and concentrating dilute aqueous solutions of formaldehyde,** the steps of distilling with a normally liquid hydrocarbon having from about 6 to about 15 carbon atoms per molecule, and collecting the overhead formaldehyde vapors and condensing as solution of greater concentration. No. 2,452,412. Soon Y. Wong (to Skelly Oil Co.).

**In a process of refining and concentrating dilute aqueous solutions of formaldehyde,** the steps of distilling with a halogenated hydrocarbon capable of forming a heterogeneous azeotrope with water, collecting the overhead formaldehyde vapors and condensing as solution of greater concentration. No. 2,452,413. Soon Y. Wong (to Skelly Oil Co.).

**In a process of refining and concentrating dilute aqueous solutions of formaldehyde,** the steps of distilling with an oxygen-containing hydrocarbon derivative substantially insoluble in water but capable of forming a heterogeneous azetrope therewith, and collecting the overhead formaldehyde vapors and condensing as solution of greater concentration. No. 2,452,414. Soon Y. Wong (to Skelly Oil Co.).

**In a process of refining and concentrating dilute aqueous solutions of formaldehyde,** the steps of distilling with a hydrocarbon derivative containing nitrogen and oxygen substantially insoluble in water but capable of forming a heterogeneous azetrope therewith, collecting the overhead formaldehyde vapors, and condensing as solution of greater concentration. No. 2,452,415. Soon Y. Wong (to Skelly Oil Co.).

**Recovery of 1-cyanobutadiene-1,3** from a mixture containing acetic acid impurity which comprises adding triethylamine to said mixture and distilling a fraction consisting essentially of 1-cyanobutadiene-1,3 from the resulting mixture. No. 2,452,460. Virgil L. Hansley (to E. I. du Pont de Nemours & Co.).

**In the catalytic dehydrogenation of nitriles for the production of unsaturated nitriles** the improvement which comprises carrying out the

dehydrogenation in the presence of a catalyst comprising a mixture of a major proportion of tungsten sulfide and a minor proportion of nickel sulfide. No. 2,452,505. John W. Teter (to Sinclair Refining Co.).

**Symmetrical 2-amino-2-alkyl-N, N'-phenyl-1,3-propane-diamines.** No. 2,452,535. Harold G. Johnson (to Commercial Solvents Corp.).

**Producing acrylonitrile** by heating ethylene cyanohydrin in the presence of a sufficient amount of a residue resulting from the heat treatment of the ethylene cyanohydrin so as to cause dehydration. No. 2,452,554. Harold S. Davis and Erwin L. Carpenter (to American Cyanamid Co.).

**N(ethylmercury) para-toluene sulfonanilide.** No. 2,452,595. Dwight F. Mowery, Jr. (to E. I. du Pont de Nemours & Co.).

**In the manufacture of amines by condensing a carbonyl compound having an unsaturated linkage with an animating agent and hydrogen,** the process of forming an aliphatic polyamine by introducing a compound chosen from the class consisting of alpha, beta, ethylenic unsaturated aliphatic aldehydes and ketones. No. 2,452,602. Correl N. Robinson, Jr. and John F. Olin (to Sharples Chemicals, Inc.).

**2-alkylidene-3-keto-4-acylamido-tetrahydrothiophene.** No. 2,452,653. Stanton A. Harris and Karl Folkers (to Merck & Co., Inc.).

**Production of alpha-beta unsaturated acids and their nitriles and esters,** by heating to boiling a mixture containing a lower fatty acid ester of a compound of formula $R_1R_2C(OH)_2$ and $CHR_3R_4$, where $R_1$, $R_2$ and $R_3$ are members of the group consisting of hydrogen of the group consisting of hydrogen atoms and lower alkyl radicals and $R_4$ is a member of the group consisting of the nitrile, carboxyl and esterified carboxyl radicles, and a free lower fatty acid, heating the vapor mixture so produced to a temperature at which the said ester decomposes into its lower fatty acid component and a compound of formula $R_1R_2C{:}CR_3R_4$ where $R_1$, $R_2$, $R_3$ and $R_4$ have the meanings set out above, separating a substantial part of its content of free lower fatty acid, and returning the separated free lower fatty acid to the boiling mixture. No. 2,452,672. Samuel Aaron Miller and Walter Henry Groombridge (to Celanese Corp. of America).

**Heating 2,5-dimethyl-1,5-hexadiene and a monomeric acrylic ester of the formula $CH_2{=}CX{-}COOY$** where X is a radical selected from the group consisting of H and alkyl and Y is a radical selected from the group consisting of alkyl, aryl and aralkyl, in the presence of a per-oxy compound catalyst to produce an acetone-soluble interpolymerizate of said monomers. No. 2,452,700. Pliny O. Tawney (to U. S. Rubber Co.).

**Production of dibasic aliphatic acids** by oxidizing a cycloparaffin in liquid phase with gaseous oxygen to form a mixture containing a non-aqueous phase comprising cyclic ketones and cyclic alcohols and an aqueous phase comprising aliphatic hydroxy acids and lactones, separating and further oxidizing said aqueous phase with gaseous oxygen to form the corresponding dibasic acids. No. 2,452,741. Harold W. Fleming (to Phillips Petroleum Co.).

**Chemical compound having the formula, $HOCH_2CFXCOOR$,** where X is a member of the class consisting of fluorine and hydrogen and R is a member of the class consisting of hydrogen and aliphatic hydrocarbon radicals having less than 12 carbon atoms. No. 2,452,791. Maynard S. Raasch (to E. I. du Pont de Nemours & Co.).

**Separating acetaldehyde from an aqueous mixture containing acetaldehyde and aldol** by contacting with the vapor of a hydrocarbon selected from the group consisting of saturated aliphatic and alicyclic hydrocarbons having from 5 to 6 carbon atoms to vaporize the acetaldehyde, the vapor of the hydrocarbon being simultaneously condensed. No. 2,452,-797. Henry B. Smith (to U. S. Industrial Chemicals, Inc.).

**In forming a sulphate wherein sulphamic acid is reacted with an organic compound containing at least one functional group selected from the class consisting of ethers, carboxylic acid esters and alcohols, containing at least one alcoholic-OH group capable of sulphation, there being present in the said organic compound no oxygen other than in the form of ethereal oxygen, carboxylic acid ester oxygen or alcoholic oxygen, the step that comprises carrying out the sulphation reaction in the presence of an amide as catalyst.** No. 2,452,943. John David Malkemus, John Ross and Dwight James Potter (to Colgate-Palmolive-Peet Co.).

**$CF_3CH_2OC_2H_5$.** No. 2,452,944. Earl T. McBee and William E. Weesner (to Purdue Research Foundation).

**Sulfolanyl sulfones.** No. 2,452,949. Rupert C. Morris and Edward C. Shokal (to Shell Development Co.).

**Heating a polychlorinated ethane** containing at least 2 chlorine atoms attached to the same carbon atom with anhydrous hydrogen fluoride in the presence of stannic chloride. No. 2,452,975. William Basil Whalley (to Imperial Chemical Industries Ltd.).

**2,4-dimethyl-6-(1 propenyl)-5,6-dihydro-1,2-pyran.** No. 2,452,977. Paul H. Williams and Seaver A. Ballard (to Shell Development Co.).

**Producing a cyclopentadiene** by dispersing a flowing stream of superheated vapors of a dicyclopentadiene in a non-liquid fluid. No. 2,453,044. Charles Eugene Staff (to Carbide and Carbon Chemicals Corp.).

**An N-monoformyl derivative of an N, N'-di-substituted ethylenediamine** selected from the group consisting of N, N'-dialkyl ethylenediamines, N,N'-diaralkyl ethylene diamines, N, N'-diaryl ethylenediamines and N, N'-dicycloalkyl ethylenediamines. No. 2,453,057. Ferdinand B. Zienty (to Monsanto Chemical Co.).

**Producing an alkylene cyanohydrin** by reacting an alkylene oxide and hydrocyanic acid in the presence of a sterically hindered amine catalyst. No. 2,453,062. Erwin L. Carpenter (to American Cyanamid Co.).

**Solid organic peroxide** desensitized against mechanical and thermal shock by a relatively water insoluble aliphatic fatty carboxylic acid. No. 2,453,070. Harlow G. Hyatt and Edward S. Shanley (to Buffalo Electro-Chemical Co., Inc.).

**Reducing the impact sensitivity** of a solid organic peroxide with calcium sulfate desensitizer by suspending the peroxide in a solution of a soluble calcium salt and adding a soluble sulfate to form insoluble calcium sulfate. No. 2,453,071. Harlow G. Hyatt and Edward S. Shanley (to Buffalo Electro-Chemical Co., Inc.).

**In the halogenation of diolefins,** the process which comprises intimately mixing a gaseous halogen and a gaseous conjugated diene and recovering the dihaloolefines produced. No. 2,453,089. Glen H. Morey and Robert F. Taylor (to Commercial Solvents Corp.).

**Carbalkoxy aminoanthraquinone sulfonamides.** No. 2,453,100. Edgar E. Renfrew, Jr. (to General Aniline & Film Corp.).

**Producing 3,4-dihydroxy-thiophene-2,5-dicarboxylic acid** by fusing 3,4-dihydroxy-2,5-dicarbethoxythiophene with a sodium hydroxide in sodium acetate. No. 2,453,102. Stockton Graeme Turnbull, Jr., (to E. I. du Pont de Nemours & Co.).

**Reacting 3,4-dihydroxy-2,5-dicarboxythiophene** with an anhydrous heterocyclic amine selected from the group consisting of pyridine and quinoline. No. 2,453,103. Stockton Graeme Turnbull, Jr. (to E. I. du Pont de Nemours & Co.).

**Aminoathraquinone sulfonamides.** No. 2,453,104. Curt G. Vogt (to General Aniline & Film Corp.).

**Preparaing a 2,3-hydroxy aromatic carboxylic acid** from a phenol which by carboxylation yields a mixture of the isomeric 2,1- and 2,3-hydroxy aromatic carboxylic acids which comprises carboxylating the phenol by subjecting it as the potassium phenolate suspended in a halogenated benzene to reaction with carbon dioxide. No. 2,453,105. Enno Wolthuis and Henry M. Shafer (to General Aniline & Film Corp.).

**Carbohydrate-boric acid salts** of amino aromatic bases. No. 2,453,108. David Curtis.

**Unsaturated acyclic primary alcohol** of the empirical formula $C_{11}H_{18}O$ and having the conjugated triene structure of allo-ocimene. No. 2,453,110. Joseph P. Bain and Albert H. Best (to Glidden Co.).

**Producing an olefin** from a mixture of 2,3-dimethyl-2-butene and an alkyl halide over fresh lime. No. 2,453,144. Wheeler G. Lovell, Maurice J. Mulligan and Hart K. Lichtenwalner (to General Motors Corp.).

**Perfluoroadipic acid.** No. 2,453,146. Earl T. Mc Bee and Park A. Wiseman (to Purdue Research Foundation).

**ROCO—$(CF_2)_4$—COOR** wherein R is selected from lower-alkyl and lower-alkenyl radicals containing from 1 to 8 carbon atoms. No. 2,453,147. Earl T. McBee and Park A. Wiseman (to Purdue Research Foundation).

**Preparation of an amino carboxylic acid** from a lactam comprising hydrolizing the lactam by a hydrolizing agent consisting of water. No. 2,453,234. Theodor Koch (to American Enka Corp.).

**Preparing ethylene sulfide-biguanide complexes** from biguanide and ethylene sulfide. No. 2,453,333. Leonard P. Moore and Watler P. Ericks (to American Cyanamid Co.).

**Flash distillation of acetophenone** from benzoic acid. No. 2,453,423. William S. Emerson and Victor E. Lucas (to Monsanto Chemical Co.).

**Producing amorpholinium salt of a naphthol sulfonic acid** by reacting the acid with morpholine. No. 2,453,430. Harold G. Grieg (to Radio Corp. of America).

**Manufacturing tetra alkyl thiuram monosulfides** by oxidizing an alkali metal salt of a dialkyl dithiocarbamic acid in the presence of an alkali metal cyanide. No. 2,453,460. Walter Arnold Robshaw (to Monsanto Chemical Co.).

**Dehydration of saturated nitriles of 2 to 4 carbon atoms per molecule** by adding methylene chloride to a hydrous nitrile, subjecting the mixture to stratification and fractionally distilling the water and methylene chloride from the lower layer as a binary azeotrope. No. 2,453,472. John W. Teter and Walter J. Merwin (to Sinclair Refining Co.).

**Phenyl- and phenylalkylamino-methylenephenaceturates.** No. 2,453,478. Arthur W. Weston, (to Abbott Laboratories).

**Process of obtaining pure nicotinamide from nicotinonitrile** comprising: reacting nicotinonitrile with hydrogen peroxide and sodium hydroxide, in the presence of alcohol, then neutralizing with weak sulfuric acid and extracting with ethyl acetate. No. 2,453,496. James F. Couch and Charles F. Krewson (to U. S. A. by Sec. of Agriculture).

**$CH_2OHCOOH.2Ti(OH)_4$.** No. 2,453,520. Carl Martin Langkammerer (to E. I. du Pont de Nemours & Co.).

**Ureylenethiophane carboxylic acids and esters.** No. 2,453,564. Bernard R. Baker (to American Cyanamid Co.).

**Dialkyl thiocetals of chloestanone-3.** No. 2,453,566. Seymour Bernstein and Louis Dorfman (to American Cyanamid Co.).

**Preparing a mixture of 5- and 6-nitro-1,4-dioxtetrahydrophthalazines** by reacting a mixture, obtained by nitrating phathalic anhydride with a mixture of concentrated sulfuric and nitric acids and then bubbling sulfur dioxide therethrough to destroy any residual nitric acid, with hydrazine sulfate in concentrated sulfuric acid. No. 2,453,578. Harold T. Lacey and Robert E. Brouillard (to American Cyanamid Co.).

**Separating monocarboxylic organic acids** having more than 8 carbon atoms in the molecule from non-acidic organic materials which comprises contacting said acids in the absence of water and in the presence of a non-polar solvent with a metal carbonate. No. 2,453,588. Orville L. Polly (to Union Oil Co. of Calif.).

**Preparation of 1,3-diketones** by reacting a mono-olefin with diketene in the presence of an acylation catalyst. No. 2,453,619. Alva C. Byrnes (to Union Oil Co. of Calif.).

**2-substituted-3,4-diamino-furan urethans and derivatives thereof.** No. 2,453,627. Klaus Hofmann (to Ciba Pharmaceutical Products, Inc.).

**Production of a 3,3,5-trialkylcyclohexyl ether** of a glycidol which comprises reacting the corresponding 3,3,5-trialkylcyclohexyl ether of a glycerol monohalohydrin with a basic-reacting compound capable of effecting the removal of one mole of hydrogen halide from one mole of the halohydrin ether. No. 2,453,634. Kenneth E. Marple (to Shell Development Co.).

**Esters of 1-cyclohexyl pyrrole 3,4-dicarboxylic acids** with dialkylamino alkanole and addition of salts of the esters with strong acids. No. 2,453,671. Donald E. Sargent (to American Cyanamid Co.).

**Esters of 1-dialkylaminoalkylpyrrole-3,4-dicarboxylic acids,** with dialkylamino alkanol and the acid addition salts of the esters with strong acids. No. 2,453,672. Donald E. Sargent (to American Cyanamid Co.).

**Esters of 2,4-dimethylpyrrole-3,5-dicarboxylic acids.** No. 2,453,673. Donald E. Sargent (to American Cyanamid Co.).

**Esters of 1,2,4-trimethylpyrrole-5-carboxyl-3-acrylic acid** with dialkylamino alkanols and addition salts of the esters with strong acids. No. 2,453,674. Theodore F. Scholz (to American Cyanamid Co.).

**Esters of 1,2,5-trialkyl-3-carbalkoxpyrrole-4-carboxylic acid** with dialkylamino alkanols and the addition salts of the esters with strong acids. No. 2,453,675. Jackson P. Sickels and Donald E. Sargent (to American Cyanamid Co.).

**Esters of 1-alkylpyrrole-3,4-dicarboxylic acids** with dialkylamino alkanols and salts of the esters with strong acids. No. 2,453,676. Jackson P. Sickels (to American Cyanamid Co.).

**Member of the group consisting of diesters of dialkyliamino alkanols and 1-aralkylpyrrole-3,4-dicarboxylic acids** and salts of the esters with strong mineral acids. No. 2,453,677. Jackson P. Sickels (to American Cyanamid Co.).

**Producing water-insoluble, oil-soluble polyvalent-metal hydrocarbon sulfonate** by forming a mixture containing water, polyvalent metal sulfonate and an emulsion-breaking, oil-soluble liquid compound consisting of C, H and O and containing 4 to about 8 carbon atoms per molecule to facilitate separation of a water-insoluble sulfonate-containing phase from an aqueous phase; and recovering the sulfonate phase. No. 2,453,690. Ulric B. Bray.

**Making ethyl chloride** by adding chlorine to a mixture of ethane and methane, exposing the gaseous mixture to a source of actinic light, and separating ethyl chloride from the reaction product. No. 2,453,-691. Howard W. Hill and Eldred L. Dance (to Dow Chemical Co.).

**4-cyano-2,5-dialkoxyacetoacetanilides.** No. 2,453,692. William H. von Glahn and Herman A. Bergstrom (to General Aniline & Film Corp.).

**Preparing quinolinic acid** by reacting quinoline with 20% oleum. No. 2,453,701. John B. Conn and Jacob van de Kamp (to Merck & Co.).

**Amidization of pyridine monocarboxylic acid compounds** by reacting a said compound with ammonia in the presence of a catalyst containing an element selected from the groups V and VI of the Mendelieff Periodic System and having an atomic number between 15 and 92 and recovering thus produced amide. No. 2,453,706. Paul W. Garbo

**Heating turpentine** with an alcoholate from the group consisting of sodium and potassium alcoholates ot remove or inactivate oxygen impurities. No. 2,453,712. Milton P. Kleinholz (to Sinclair Refining Co.).

# *Trademarks of the Month*

**A Checklist of Chemical and Chemical Specialties Trademarks**

**LOX.** Adhesive cement. 481,279. Firestone Industrial Products Co.

**Pro-kem.** Liquid chemical boiler scale remover, liquid brine-solvent for cleaning creamery tanks, etc., and metal cleaning paste for solvent for the removal of surface film. 482,892. G. Byron Reese d/b/a Progressive Chemical Co.

**Texana SUDS.** Granulated, liquid, bar, and flaked soaps. 489,424. Texas Soap Mfg. Corp.

**TEXCEL.** Pressure-sensitive adhesive tapes. 491,096. Industrial Tape Corp.

**KAYGAS.** Propane, oxygen, hydrogen, acetylene, carbon dioxide and compressed air. 492,-925. Kay Gases Co.

**Atlas.** Fumigating, mothproofing, and exterminating materials. 495,110. William J. Stover d/b/a Atlas Fumigating and Exterminating Co.

**HYDRAMINE.** Synthetic resins. 497,572. Sharples Chemicals, Inc.

**RUX.** Rug and carpet cleaning compounds. 499,972. Good Housekeeping Appliances, Inc.

(Symbol). Liquid which when sprayed deodorizes and freshens the air. 500,891. Miller-Protecto Products Co.

**Starco.** Window cleaning compounds and toilet bowl cleaning compounds. 501,780. Star Chemical Co.

**Equavis.** Motor lubricating oils and lubricating greases. 503,116. Panhandle Producing & Refining Co.

**PinEdle.** Deodorant and disinfectant. 506,-138. Sunshine Products Co.

**S.S.** Valve greases. 513,408. Lubricosos Specialties Mfg. Co.

**FIREGARD.** Preparation to be applied to canvas to render the same fire-resistant and waterproof, and as a preservative. 503,544. H. B. Fred Kuhls.

**Leather lustre.** Preservative and cleaner for leather. 503,702. Frank H. Riley d/b/a Leather Lustre.

**ARALDITE.** Synthetic resinous adhesives. 505,804. Ciba Ltd.

**Dispelent.** Insect repellent. 506,275. United Cigar-Whelan Stores Corp.

**San-Can.** Chemical preparations for the destruction of garbage odors and insects. 506,-703. Tad Chemical Co.

**S.T.R.** Rare earths and rare earth oxides. 507,435. Societe de Produits Chimiques des Terres Rares.

**PESTMASTER.** Insecticide. 508,540. Michigan Chemical Corp.

**FLAX TREAT.** Ground flax seed mixed with other chemicals used in treating evaporated water in making fresh water from brine. 509,-286. Treatment Service & Engineering Co.

**Perfuma Saltz.** Product for deodorizing and perfuming interior spaces. 510,635. Adco, Inc.

**EMULPHOGENE.** Detergents for household and industrial purposes. 511,080. General Dyestuff Corp.

**Vitron.** Cements that contain glass fibers and have adhesive properties. 513,916. Vitron Corp.

**GDC.** Detergents. 514,028. General Dyestuff Corp.

**ZINSPER.** Zinc soap consisting of zinc oxide and resin and fatty acids, used as a dispersing and activating agent for natural and synthetic rubber formulations. 515,008. Witco Chemical Co.

**SANASCENT.** Cleanser and detergent having incidental properties as a water softening compound. 515,517. Sana-Scent Co.

**Doc his patients all die.** Insecticides, rodenticides, and fungicides. 515,631. Paramount Pest Control Service.

**ROCHELTEX.** Liquid addition agent for electroplating solutions. 515,887. MacDermid Inc.

**KEEPKAN.** Liquid cleaner for paint brushes. 516,393. James H. H. Bradford d/b/a The Howe Co.

**Santa Maria.** Toilet soap. 516,672. Chicago Sanitary Products Co.

**PLASTIGLAZE.** Transparent, air drying, impregnating plastic coating composition. 517,-958. Calresin Corp.

**P. D. Q. Printing ink.** 519,353. Sun Chemical Corp.

**Eston.** Fumigating compounds, refrigerants, preserving chemicals, photographic chemicals, disinfecting chemicals, insecticides, solvents, chemicals for fire extinguishers, and cleansing chemicals. 520,499. Eston Chemicals, Inc.

**INSECT-O-LITE.** Insecticides. 520,605. Avilite, Inc.

**CIRCO.** Lubricating oil. 521,295. Sun Oil Co.

**RADIUM.** Hand soap in paste form. 522,-714. Radium Hand Soap Co.

**Diversey.** Disinfectant, bactericide and deodorizer in solid form, scale and rust remover compound to control excess foaming in bottle washing machines, compound for sterilizing and treating water, compound in powdered form for the prevention of scale in milk cans, milking machinery and the like, rust preventative in liquid form, alkaline in powdered form for neutralizing cream for use in making butter and insecticide. 522,739. Diversey Corp.

**CENCO.** Reagents and volumetric solutions for use in chemical, clinical and biological laboratories for testing purposes. 523,077. Central Scientific Co.

**BRITEX.** Soap, cleaning compounds for fabrics, and compounds for removing stains from fabrics. 523,630. Ernest E. Van Allsburg d/b/a Van Chemical Co.

**ZERO-MOTH.** Mothproofing fluid. 524,481. Zero-Moth Mfg. Co.

**SHERWIN-WILLIAMS.** Insecticides, fungicides, herbicides, germicides, disinfectants, pesticides, intermediates, for use in organic synthesis in the production of pharmaceuticals, dyes, dyestuffs and other artificial products; castor oil and dehydrated castor oil; dyes and dyestuffs for general use in the industrial arts; and soaps for use (other than as detergents) in the chemical and other industrial arts as dispersing agents, wetting agents, flocculating agents and extenders and substrata for pigments and dyestuffs. 524,730. Sherwin-Williams Co.

**KRALAC.** Thermoplastic resins for molding and forming. 526,644. United States Rubber Co.

**AVolite.** Ready mixed paints, paste paints, paint enamels, varnishes and stains. 526,733. Atlantic Varnish & Paint Co., Inc.

**EXCELLO.** Sudsing cleaner, cleanser, and detergent. 527,688. Procter & Gamble Co.

**BIG CROP.** Fertilizer. 528,414. Armour & Co.

**EXAVON.** Textile treatment chemicals. 528,501. Joseph George Nathanson.

**EXAMIDE.** Textile treatment chemicals. 528,502. Joseph George Nathanson.

**SHUR.** Cleaning compound for use in washing automotive vehicles, painted and tiled surfaces, fabrics, carpeting, upholstery, and cooking and eating utensils. 528,522. Shur Gloss Mfg. Co.

**DIF.** Hand cleaner, a chemical abrasive compound used in association with water for the purpose of hand cleaning and household scouring; and liquid polish, a chemical compound for the purpose of cleaning and polishing all metals, silverware, windows, glassware, porcelain, marble or tile. 529,370. Dif Corp.

**ORACLON.** Synthetic resins. 529,799. Monsanto Chemical Co.

**K.O.P.** Soap. 529,857. Armour & Co.

**EVERSTIK.** Gummed sealing tape. 530,-612. Wortendyke Mfg. Co.

**"THAW-STICK".** Preparation in stick form which is applied to windows to prevent fogging and formation of ice in cold weather. 530,717. Manson Distributors.

**Double Q.** Soap. 531,028. Great Stuff Products, Inc.

**SI-LAC.** Cement used in attaching gaskets to form oil-tight seals. 531,386. James B. Sipe & Co.

**INLAND.** Adhesive cements and cementitious vulcanizing gums for patching rubber goods. 531,596. Inland Rubber Corp.

**INLAND.** Adhesive cements and cementitious vulcanizing gums. 531,604. Inland Rubber Corp.

**HYDROCHLIN.** Dehydrochloric acid. 533,-527. Armour & Co.

**Super 60.** Brake fluid for hydraulic brakes and other hydraulic systems which use a nonmineral oil base fluid. 533,613. Puritan Co., Inc.

**K-T.** Polishing and waxing preparations. 534,279. A. S. Harrison Co.

**CUDAHY'S QUICK SUDZ.** Soap in shredded form. 534,514. Cudahy Packing Co.

**DYANSHINE.** Polish for leather goods. 534,591. Barton Mfg. Co.

**Multipower motor oil.** Motor lubricating oils. 534,802. Ohio Oil Co.

**RAMCO.** Cleaning and scouring compounds having incidental deodorizing and water softening properties. 535,645. R. A. Myers & Co.

**KWIK-BLAK.** Salt compositions for metal-treating baths. 535,957. Heatbath Corp.

**Tempest.** Soap. 535,974. Lucien Lelong.

**MONROE.** Chemical antiseptic, insecticides, germicide, disinfectant, and deodorant. 536,707. Monroe Laboratories, Inc.

**DURA DUST.** Agricultural and horticultural insecticides. 536,744. Acme White Lead and Color Works.

**VALOY.** Soaps. 537,684. Salomon Freres, Societe A Responsabilite Limitee.

**KUMAR KLEENAR.** Chemical cleaning compound having incidental properties as a germicidal, deodorant and disinfectant. 537,804. Kumar Kompany, Inc.

**HYDRO-TAC.** Antislipping preparations applied to the fingers or the hands. 539,418. Hydro-Chemical Co., Inc.

**MINNSPAR.** Varnish. 539,606. Minnesota Linseed Oil Paint Co.

(Symbol). Insecticides in powder form; chemicals for killing noxious weeds and plants and liquid chemical compositions for use as an insecticide. 540,850. Michigan Chemical Corp.

**STANLEY'S CROW REPELLENT.** Liquid composition for treating seeds to protect them from seed pulling birds and animals. 541,259. Cedar Hill Formulae Co.

**SPRUCE EXTRACT.** Liquid composition employed as a treating and tanning agent in the manufacture of leather from hides and skins. 541,462. Robeson Process Co.

**MIDWESTERN.** Fertilizer compounds. 541,-563. Midwestern Phosphate Corp.

**Taps.** Insecticides. 541,957. Pacific Guano Co.

**DIVORBRITE.** Chemical preparation in powdered form, for bottle washing and food machinery cleaning. 542,014. Diversey Corp.

**Stalfort's '68.** Shoe dye. 542,363. John C. Stalfort & Sons, Inc.

**DYLON.** Textile dyes and dyestuffs. 542,-855. Mayborn Products Ltd.

(Symbol). Textile dyes and dyestuffs. 542,-856. Mayborn Products Ltd.

**S S.** Silicate of soda, either anhydrous, hydrated, or in solution. 543,036. Philadelphia Quartz Co.

**ELVACET.** Polymerized vinyl ester or esters. 543,575. E. I. Du Pont de Nemours & Co.

**ELVANOL.** Vinyl polymer in the nature of polyvinyl alcohols and partially esterified polyvinyl alcohols. 543,576. E. I. Du Pont de Nemours & Co.

**MEM.** Soaps. 543,638. Mem Co.

**SOLVA.** Polyvinyl acetate resins. 543,660. Shawinigan Products Corp.

**PIONEER.** Sulfur. 543,758. Stauffer Chemical Co.

**GY-KIL.** Insecticides. 543,916. Geigy Co., Inc.

**NEWPORT.** Rosin. 543,977. Newport Industries, Inc.

**SCAN.** General household cleaner. 544,221. Theobald Industries.

**METSO.** Silicate of soda. 544,656. Philadelphia Quartz Co.

**PARADYNE.** Chemical ingredient used as an additive for liquid fuel, used, among other things, as inhibitors, lead stabilizers, and for preventing the formation of gum or gum forming materials in the fuel, retarding or preventing harmful deposits in the induction systems and on valves of internal combustion engines, softening and removing of preformed gummy deposits on valves, reducing and preventing valve sticking and providing supplementary lubrication to parts not readily supplied with lubrication from the oil system of the engine. 545,108. Eniay Co., Inc.

**ALPHATRON.** Fertilizers. 545,232. Canadian Radium & Uranium Corp.

**Hewitt.** Sudsing cleaner, cleanser and detergent. 545,741. Hewitt Soap Co., Inc.

**CARBONOX.** Water-dispersible organic salt for the treatment of well-drilling fluids. 546,-722. National Lead Co.

**KEMBREAK.** Soluble salt for use in the preparation and treatment of well drilling fluids. 546,812. Accuracy Rig Tool Co.

**J.** Silicate of soda. 547,392. Philadelphia Quartz Co.

**M.** Silicate of soda. 547,393. Philadelphia Quartz Co.

**N.** Silicate of soda. 547,394. Philadelphia Quartz Co.

**O.** Silicate of soda. 547,395. Philadelphia Quartz Co.

**PQ.** Silicate of soda and silicate of potash. 547,396. Philadelphia Quartz Co.

**S.** Silicate of soda. 547,397. Philadelphia Quartz Co.

**STAR BRAND.** Silicate of soda. 547,399. Philadelphia Quartz Co.

**U.** Silicate of soda. 547,400. Philadelphia Quartz Co.

**Conti.** Soap. 547,405. Conti Products Corp.

**ALLWITE.** Preparation for cleaning and polishing shoes. 547,626. Griffin Mfg. Co.

**Commando.** Insecticides. 547,861. Mayfair Industries, Inc.

**ROYLITE.** Composition for cleaning metals. 548,366. Hanson-Van Winkle-Munning Co.

**Hep.** Insecticides. 548,786. Bostwick Laboratories, Inc.

**ABINCO.** Modified (i.e. oxidized or chlorinated) starch for industrial use. 549,042. Anheuser-Busch, Inc.

**B.** Silicate of soda. 549,319. Philadelphia Quartz Co.

**EVERGREEN.** Soap. 549,827. Murphy Laboratories, Inc.

**Cosma Kote.** Liquid coating for glass and lens surfaces for resisting smear and dust. 551,-090. Cosmet Co.

**WAX-THETIC.** Combination soap and wax detergent material. 552,646. Essential Chemicals Co.

**CHROMACYL.** Dyes used in the dyeing of textile fibers. 553,578. E. I. Du Pont de Nemours & Co.

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